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Pediatrics

CLINICAL PROFILE OF CHILDREN PRESENTING WITH FIRST COMPLEX FEBRILE SEIZURES

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ABSTRACT

Introduction: The most consistent risk factors reported are a family history of FS and onset of first FS at less than 18 months of age. Two other definite risk factors for recurrence of FS are peak temperature and the duration of fever prior to seizure. The higher the peak temperature, the lower the chance of recurrence; children with a peak temperature of 101°F had a 42% recurrence risk at 1 year, compared with 29% for those with a peak temperature of 103°F, and only 12% for those with a peak temperature >105°F. **Methodology:** All the pediatric patients fulfilling the inclusion criteria, admitted in the pediatric medicine ward during the study period were enrolled in the study. After applying the formula the minimum sample size is calculated to be equal to 62. Expecting the non response, the final sample size of 125 was taken for the study. **Results:** Among the total 125study participants, 71.2% were immunized against Hemophilus influenzae type b and none of them were immunized against streptococcus pneumonia. **Conclusion:** In our study, the most common presentation of complex febrile seizure was focal, compared to others.

KEYWORDS : First Complex Febrile Seizures, Hemophilus influenza, FS

INTRODUCTION:

Although the mechanism of FS remains unclear, animal models are informative.[61] First, elevated brain temperature alters many neuronal functions, including several temperature-sensitive ion channels. This influences neuronal firing and increases the probability of generating massive neuronal activity, i.e., seizures. Also, an inflammatory process including secretion of cytokine in the periphery and in the brain is known to be a part of the mechanism. Second, it was discovered that fever and hyperthermia share common mechanisms in provoking seizures: the fever-promoting pyrogen interleukin-1β contributes to fever generation and conversely, fever leads to the synthesis of this cytokine in the hippocampus.[1] In addition, interleukin-1β has been shown to increase neuronal excitability, acting via both glutamate and GABA. In vivo, these actions of interleukin-1β enhance the actions of seizure-provoking agents. The importance of endogenous interleukin-1β in the occurrence of FS was supported by studies in mice that lacked the receptor for this cytokine. Fever of specific infectious etiologies, specifically human herpes virus 6 (HHV6), might influence the probability of generation of FS. Third, hyperthermia-induced hyperventilation and alkalosis have been proposed as a pivotal element of FS generation in that alkalosis of the brain provokes neuronal excitability and contributes to seizure pathophysiology. However, human conditions associated with severe alkalosis, including prolonged crying and pyloric stenosis of infants, are not associated with the generation of seizures.[2]

Overall, approximately one-third of children with a first FS experience one or more recurrent FSs and 10% have three or more FSs. The most consistent risk factors reported are a family history of FS and onset of first FS at less than 18 months of age. Two other definite risk factors for recurrence of FS are peak temperature and the duration of fever prior to seizure. The higher the peak temperature, the lower the chance of recurrence; children with a peak temperature of 101°F had a 42% recurrence risk at 1 year, compared with 29% for those with a peak temperature of 103°F, and only 12% for those with a peak temperature >105°F. The shorter the duration of recognized fever, the higher the chance of recurrence; the recurrence risk at 1 year was 46% in children who experienced FS within an hour of recognized onset of fever, compared to 25% in children with prior fever lasting 1 to 24 hours, and 15% in children with more than 24 hours of recognized fever prior to the FS. Children with multiple risk factors have the highest risk of recurrence.[3] A child with two or more of the risk factors has a recurrence rate greater than 30% at 2 years; a child with three or more risk factors has a recurrence rate greater than 60%. In contrast, recurrence risk is less than 15% for a 2-year-old child with none of the risk factor. A recurrent FS is also more likely to be prolonged if the initial FS was prolonged. The existence of any relationship between a family history of unprovoked seizures or epilepsy and the overall risk of FS recurrence appears to be doubtful.[4]

METHODOLOGY:

The study includes the children between the ages of 6 months to 5 years admitted as first complex febrile seizure in the department of pediatric medicine.

Study design:

Cross sectional study. All the pediatric patients fulfilling the inclusion criteria, admitted in the pediatric medicine ward during the study period were enrolled in the study.

Sample size with justification:

As per the study conducted by Seltz LB et al, the prevalence of acute bacterial meningitis was 4% in children with first complex febrile seizure.

The sample size is calculated using the formula of single proportions.

Sample size, $n = \{Z^2 \times P(1-P)\} / E^2$

Where Z=value from standard normal distribution corresponding to desired confidence level (Z=1.96 for 95% CI)

P is expected true prevalence = 5% =0.05

E is desired precision of estimate = 0.05

After applying the formula the minimum sample size is calculated to be equal to 62.

Expecting the non response, the final sample size of 125 was taken for the study.

Inclusion criteria:

All patients between the ages of 6 months to 5 years admitted in pediatric medicine department as first complex febrile seizures [prolonged (>15 min) and/or focal and/or reoccurs within 24 hr].

Exclusion criteria:

- The patients who did not meet the criteria for CFS
- The patients with prior history of simple/complex febrile seizures
- Those patients who presented with unprovoked seizures (afebrile seizures)
- The patients with any neurological abnormalities
- The patients with a preceding history of trauma

RESULTS:

Table 1: Distribution of study participants according to age groups

Age	Frequency	Percent
6-12 months	43	34.4
13-24 months	38	30.4
25-36 months	26	20.8
37-48 months	10	8.0
49-60 months	8	6.4
Total	125	100.0

Out of the total 125 respondents, 43 (34.4%) belonged to 6- 12 months of age, 38 (30.4%) belonged to 13-24 months, 26 (20.8%) belonged to 25-36 months, 10 (8%) belonged to 37-48 months and 8 (6.4%) were aged 49-60 months.

Table 2: Sex wise distribution of study participants

Sex	Frequency	Percentage

Female	45	36.0
Male	80	64.0
Total	125	100.0

The gender distribution of the study subjects indicated the bulk of the patient were males accounting 64% (n=80) and 36% (n=45) were females, indicating male preponderance with a male to female ratio 1.7:1.

Table 3: Distribution of study participants according to character of complex febrile seizure

Character Of Febrile Seizure Complex	Frequency	Percent
Focal	40	32
Prolonged	33	26
Recurrent	34	27
Focal+Prolonged	7	6
Focal+Recurrent	4	3
Prolonged +Recurrent	6	4
Focal+Prolonged+Recurrent	1	1
TOTAL	125	100

In our study, the most common presentation of complex febrile seizure was focal, compared to others.

Table 4: Distribution according to Family history

Family history	Frequency	Percentage
Yes	16	12.8
No	109	87.2
Total	125	100.0

Among the study subjects, 12.8 %(n=16) had family history of febrile seizure, compared to 87.2%(n=109) who had no family history.

Table 5: Distribution according to immunization history

Hib vaccination	Frequency	Percentage
Received	89	71.2
Not received	36	28.8
Total	125	100.0
Pneumococcal vaccination	**Frequency**	**Percentage**
Received	0	0
Not received	125	100
Total	125	100.0

Among the total 125 study participants,71.2% were immunized against Hemophilus

influenzae type b and none of them were immunized against streptococcus pneumoniae.

DISCUSSION:

Acute bacterial meningitis may manifest as complex febrile seizure in children. Many studies have been conducted to show the rate of occurrence of acute bacterial meningitis in children who are presenting as complex febrile seizure. A detailed review of some of the studies is as follow.

In a retrospective cohort study conducted by Kimia et al.[5] on the yield of lumbar puncture among children between the ages of 6 months to 5 years who presented with first complex febrile seizures, out of 526 patients presented with complex febrile seizure, LP was done in 340 patients. Among them, fourteen patients had CSF pleocytosis; 2 had ABM. Of the remaining 12 patients with CSF pleocytosis, 9 were admitted to the hospital, and 3 were discharged (the CSF WBC count was 8, 10, and 28 cells per L). All were seen by the neurology service and had no sequelae in follow-up. Of the admitted patients, 4 had presumptive meningoencephalitis on the basis of clinical signs, symptoms, and suggestive findings on EEG. Five had a presumptive diagnosis of viral meningitis.

Three patients met study criteria for ABM (0.9%), all with S pneumoniae. Two had Streptococcus pneumoniae in a culture of their cerebrospinal fluid. Among these 2 patients, 1 was nonresponsive during presentation, and the other had a bulging fontanel and apnea. The third child appeared well; however, her blood culture grew S pneumoniae and failed the LP test. Two of the patients presented before the introduction of conjugated pneumococcal vaccines. A contaminant was isolated from 8 specimens: 4 nonaureus staphylococci, 3 viridans streptococci, and 1 micrococcus species. None of the remaining 12 patients with CSF pleocytosis had bacteria recovered from cultured CSF or blood. Three had received previous antibiotic therapy.None of the 186 patients who did not have a LP returned to the hospital with a diagnosis of ABM. Among the 186 patients, 161 (87%) were seen at our facility for follow-up; none had a clinical course of ABM after their initial ED visit.

Seltz LB et al[6] in their study on the Risk of bacterial or herpes simplex virus meningitis/encephalitis in children with complex febrile seizures (2009) showed that only 37% (146) of the 366 patients had an LP performed; out of 146 patients on whom LP was done, 7 was diagnosed as acute bacterial meningitis and 1 was diagnosed as HSV encephalitis. The rates based on patients who had LPs performed are closer to 4% and 0.7%, respectively. The diagnosis of meningitis or encephalitis was based on CSF findings; Rate of CNS infection was significantly LOWER in non-referred patient encounters (0.3%; 95% CI, 0.0-2.0) than in referred patient encounters (8.0%; 95% CI, 3.4-16.7) (P < 0.001).

Rates of CNS infection were HIGHER in children with an abnormal mental status examination (n=119). Seven (6%) of the 119 patients encounters with a decreased mental status had CNS infection as compared with none in those with a normal mental status examination (P < 0.001).

Rate of CNS infection in encounters in infants </= 18 months was the SAME as the rate in infants older than 18 months (P = 0.40). In patients with a history of previous febrile convulsions, no patient (0/140; 0.0%; 95% CI, 0.0-3.2) was diagnosed with a CNS infection compared with 7 out of 250 (2.8%; 95% CI, 1.2-5.8) patients presenting with a first febrile seizure (P = 0.09).

Sangeeta VB et al., [7] conducted a retrospective hospital based study to determine the clinicoetiological profile, need for lumbar puncture (LP) and to assess the prevalence of meningitis in children aged between 6 months to 24 months with first episode of febrile seizures. It was shown that all the babies whose CSF was suggestive of meningitis were between the age group of 6-12 months implicating clinical signs of meningitis may be more difficult to identify in this younger age group. And all cases of meningitis were reported in boys.[8,9]

CONCLUSION:

The mean age of presentation of complex febrile seizure in our study was 22 months, with a minimum age of 6 months and maximum age of 60 months. 60.8% of children belong to 6-24 months of age constituting major bulk of study population.

Among the enrolled children 36% were female and 64% were male with a male to female ration of 1.7:1. Family history of febrile seizure was present in 12.8% of children. 71.2% of babies were vaccinated against H.influenza and none of our study subjects were vaccinated for Streptoccus pneumoniae.

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