

A STUDY ON THE RISK FACTORS FOR RECURRENCE OF FEBRILE SEIZURES IN CHILDREN ADMITTED IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Febrile seizures (FS) are the most common neurological disorder among children. Although generally benign, recurrence is frequent and identifying risk factor is essential for further counselling and follow up. The objective is to evaluate demographic and clinical risk factors associated with recurrence of FS in children aged 6 – 60 months. **Materials and Methods:** This descriptive study was conducted at the department of Paediatrics, Govt. Theni Medical College Hospital, Theni between July 2017 and June 2018. Children aged 6 – 60 months presenting with simple or complex FS were enrolled and those with CNS infection, metabolic seizures, trauma, afebrile seizures were excluded. Data on clinical profile, laboratory parameters were collected. Statistical analysis was performed using Chi-square test: $p < 0.05$ was considered significant. **Result:** Among 5239 paediatric admissions, 223 children (4.25%) had febrile seizures; 146 were male children. Of these 111 (49.8%) children with seizure recurrence, majority (73%) were aged less than one year at the occurrence of first febrile seizure. Significant risk factors of recurrence were age < 1 year at first FS ($p = 0.0001$), male sex ($p = 0.006$), fever duration < 24 hours prior to seizure ($p = 0.01$) and multiple seizures ($p = 0.004$). Family history of FS ($p = 0.3$), anemia ($p = 0.6$) and hyponatremia ($p = 0.2$) were not significantly associated. **Conclusion:** First FS before one year of age, male gender and short fever duration are major predictors of recurrence. Children with these risk factors require regular follow up and parental education.

INTRODUCTION

Febrile seizures are the most common neurologic disorder among infants and young children. They are an age-dependent condition, occurring in 2 to 5% of children younger than five years of age. Incidence of febrile seizure is observed between 2 - 5% amongst Caucasian children, 5 - 10% in India and up to 8.8% in Japan.^[1-4]

Simple febrile seizures are defined as generalized seizures lasting less than 15 minutes and not recurring within 24-hours. While they eventually recur in one-third of children during their early childhood, otherwise they are benign condition. Febrile seizures which are focal, prolonged (> 15 min), multiple within the first 24 hours are defined as complex febrile seizures. Recurrence rate ranges from 21-29% in developing countries and 30 -50% in Western cohorts.

Recurrent Febrile Seizures: Febrile seizures recur 30% of children after the first episode, 50% after two or more episodes and 50% of infants less than one year old 6. Half of recurrences occur within six months following the first episode, 3/4th of recurrences within 1 year and 90% occur within 2 years of first episode.^[6,7]

The most cardinal risk factors for recurrence of FS are family history of FS and onset of first febrile seizure at less than 12 months of age 5. Two other definitive risk factors are height of the temperature and the time interval between the onset of fever and the episode of seizure ^[6-9]. These are some of the predictors of recurrence reported in the literature. However, findings are inconsistent and regional differences exist.

This study aimed to estimate the prevalence of FS and identify the risk factors for recurrence among children aged 6 months to 60 months admitted to a tertiary hospital in Tamil Nadu.

Objective:

- To investigate the effect of age, gender, temperature, past history of seizure, developmental and family history, duration, type and number of seizures, anemia and hyponatremia on recurrence of febrile seizures.

MATERIALS AND METHODS

Study Population: Children aged 6 months to 60 months with both simple and complex febrile seizures were included after informed consent from parents / guardians.

Institutional ethical committee approval was obtained prior to the commencement of the study.

Exclusion Criteria

- Children with seizure suspected to have central nervous system infection (meningitis, encephalitis) on first day itself and also diagnosed following LP.
- Children with seizure due to hypocalcaemia, hypomagnesaemia or hypoglycaemia.
- Children with at least one episode of afebrile seizure
- Seizure following trauma, drug or toxin intake
- Seizure in children with CSOM

Methodology

Study Design: This Descriptive study was taken place in Paediatric ward, Department of Paediatrics, Govt Theni Medical College Hospital, Tamil Nadu during period extended from July 2017 to June 2018. After getting informed written consent from the parents or care givers, Children of both sexes from 6 months to 60 months of age having simple or complex febrile seizure were admitted and investigated regarding various risk factors for recurrence of febrile seizure. Other etiologies causing fever with seizure were excluded by history, clinical examination and relevant investigations. Children with recurrent febrile seizures were reviewed with their old records. All children either first episode or recurrence were followed up fortnightly in specialty OPD during the study period.

Lab Investigations

- Hemoglobin -If Hb level was less than 11 g / dl, it was considered as anemia.
- Random blood sugar -Any child who had RBS less than 54 mg / dl, was excluded from this study.
- Renal function test -Children with elevated RFT were also excluded. (urea > 40 mg / dl, Creatinine > 1 mg / dl)

Serum electrolytes: Serum sodium level less than 135 meq / L was considered as low sodium level.

- Serum Potassium -Children with K⁺ either < 3.5meq / L or > 5meq / L were considered as having abnormal potassium level and excluded.
- Serum calcium - Serum Calcium < 9 mg /dl was considered as hypocalcemia and excluded from this study.
- CSF analysis done if meningitis suspected.

Categorization of Risk factors:

1. Age (<12 months, ≥12 months)
2. Gender (male, female)
3. Duration of fever (<24 hrs, ≥24 hrs)
4. Intensity of temperature (<102.2°F, ≥ 102.2°F)
5. Type of febrile seizure (simple, complex)
6. Duration of seizure (< 5min, > 5 min)
7. Past history of febrile seizure (recurrence) (yes, no)
8. Number of recurrence (single, multiple)
9. Family history of febrile seizure (positive, negative)
10. Family history of epilepsy (positive, negative)
11. Developmental history (normal, delayed)
12. Hemoglobin (<11g/dl, ≥ 11g/dl)
13. Serum Sodium (<135meq, 135-145meq)

Statistical Analysis: The data collected from the selected subjects were recorded in Master Chart. The values analyzed with the help of SPSS version 16. Bivariate statistical analysis of Chi – Square test was used to analyze and 'p < 0.05 was considered statistically significant.

RESULTS

Out of 5239 Children were admitted in paediatric ward, 223 children were diagnosed as having febrile seizures based on the clinical presentation and enrolled. In this study, the prevalence of febrile seizures was 4.25% among total admission.

Recurrent febrile seizures: Among 223 children with FS, 111 children (49.8%) had developed recurrent febrile seizures in the upcoming years. Rest of the children (50.2%) did not have even one recurrence.

Association with age and sex: Among 111 children with recurrent FS, 81 children (73) had experienced initial febrile seizure when they were less than one year old.

Male children had a significant association with recurrence of febrile seizure statistically with the p value of 0.006

Association with fever duration

Out of 111 patients with recurrent febrile seizures, 82 patients (73.9%) developed seizures within 24 hours of the onset of fever. Rest of the 29 patients (26.1%) developed after 24 hours of the onset of fever.

Association with multiple episode of recurrent FS: Multiple recurrent febrile seizures significantly increase the risk of future recurrences. (p = 0.004)

Finally, in this study, Age at first febrile seizure less than one year, male sex, duration of fever less than 24 hours, multiple recurrent febrile seizure were having statistically significant relationship (p<0.05) with recurrence of FS.

Duration of seizure, family H/o FS, anemia, low serum sodium level at the time of presentation didn't have significant relationship with recurrence of FS.

Table 1: Association of risk factors with recurrence.

Risk Factors	Recurrent FS			Chi Sq	p Value
	No	Yes	Total		
Age at first FS					
<1 yr	0	81	81	125.22	0.0001
>1 yr	112	30	142		
Total	112	111	223		
Sex					
Male	63	83	146	7.66	0.006
Female	49	28	77		
Total	112	111	223		
Duration of fever					
<24 hour	99	82	181	6.77	0.01
>24 hour	13	29	42		
Total	112	111	223		
Recurrent FS No					
1	68	47	115	6.82	0.004
>1	44	64	108		
Total	112	111	223		
Family H/O FS					
No	68	60	128	1.01	0.3
Yes	44	51	95		
Total	112	111	223		
Anemia					
<11	69	64	132	0.2	0.6
>11	43	47	91		
Total	112	111	223		
Serum Sodium					
<135	22	30	52	1.69	0.2
135-145	90	81	171		
Total	112	111	223		

DISCUSSION

Recurrent febrile seizures: In the present study, it has been found that 49.8% of children with FS had experienced recurrence. It is aligned with the studies of Anil Raj Ojha et al,^[15] (51%) Ausi Indriani et al,^[11] (37.6 %) Jyoti Agrawal et al,^[13] 1/3 of children had recurrent febrile seizures among 92 children.

Age at onset: In this study, we included children aged 6 to 60 months with febrile seizure and found that children with age less than 12 months at first FS (73%) had increased incidence of recurrent FS. This findings consistent with Nadirah rasyid ridha et al,^[12] Berg AT et al,^[16] KK Chan et al,^[14] and Yusra Fayyad Alwan et al.^[16] They also found recurrent FS occurred in >60% in infants.

Gender: In the present study, 74.8% male children had recurrence. Similarly, Z.Habib et al,^[10] in their study, found that among children with recurrent FS, 57% were males and 43% were females. Males are 1.3 time more prone for recurrent FS than females. Likewise Jyoti Agrawal et al,^[13] Ausi Indriani et al,^[11] shown that recurrent FS were significantly more in males and than females. It may be due to lower seizure threshold in boys.

Fever Duration: In this study, short fever duration (< 24h) before seizure strongly predicted recurrence. 73.9 % of children with recurrence had seizure within 24 hours of fever and rest of them (26.1%), after 24 hours. Similar results were obtained in the following studies; In the study of Berg AT et al,^[16] Nadirah Rasyid ridha et al,^[12] Ausi Indriani et al,^[11] Anil Raj Ojha et al,^[15] they had enlightened recurrent FS more common within 24 hours of fever.

CONCLUSION

We have studied 223 children having diagnosed as febrile seizure among 5239 children admitted in our hospital during the one year of study period.

In this study recurrent febrile seizures,

- Prevalence of FS among Paediatric admission was 4.25%
- Nearly 49.8% children developed recurrence.
- Significant risk factors for recurrent FS: age<1 year at first FS, male sex, fever lasting <24hour and multiple episodes of FS
- Non-significant risk factors for recurrent FS: family history, anaemia, hyponatremia

Implications: Children with these risk factors for recurrent febrile seizure should be monitored closely. Parents and care givers must be counselled regarding the management of the febrile seizures at their home in an emergency situation. Parents should be informed about that the children having the above mentioned risk factors would have a chance of recurrent FS in the future.

Long term prophylaxis should be used cautiously because of the adverse effects of antiepileptic drugs.

Future directions:

- Genetic and metabolic studies may clarify the underlying reason for recurrent FS.
- Large multicentre analytical studies are needed to determine the risk factors for febrile seizure recurrence.
- Future studies are needed to identify the preventive measures to be taken before the recurrence of febrile seizure.

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