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Assessment Of Risk Factors For Recurrent Febrile Seizures Among Children Aged Below 5 Years

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Abstract:
Background*: Febrile seizures are seizures that occur between the ages of 6 and 60 months with a temperature of 100.4°F or higher, that are not result of CNS infection or any metabolic imbalance and that occur in the absence of a history of prior afebrile seizures. They occur in around 2% of 5% of children and recurrence is seen in about one-third of children. Very few studies till now reported the risk factors of recurrence of febrile seizure from India. Therefore, the present study was conducted to know the risk factors associated with recurrence of febrile seizures among South Indian children.*
Objectives:
1. To know the incidence of recurrence of febrile seizures among children.
2. To study the risk factors of recurrent febrile seizures among children aged below 5 years.
Materials and Methods*: 50 children with febrile seizures were included. The study was done in the Department of Pediatrics at ASRAM, Eluru, Andhra Pradesh, India. Male and females children aged 6 months to 5 years with clinical features suggesting febrile seizures were included.*
Results: *Among 50 children included, 22 had recurrent febrile seizures and 28 had no recurrent febrile seizures. Overall 29 children were males. Family history of febrile seizures, young age, family history of epilepsy, temperature below 102°F, less duration of fever, complex febrile seizures are found to be risk factors for recurrence. Gender and duration of febrile seizures were not associated with the recurrence.*
Conclusion: *The current study revealed that younger age at onset of 1st episode of seizure, lower temperature during the episode, brief duration between onset of fever and seizure episode and family history of febrile seizures were associated with recurrence of febrile seizures.*
Keywords: *Febrile seizures, Fever, Incidence, Risk factors, Profile and pattern*

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I. Introduction

Febrile seizures are seizures that occur between the ages of 6 and 60 months with a temperature of 100.4°F or higher, that are not result of CNS infection or any metabolic imbalance and that occur in the absence of a history of prior afebrile seizures. Febrile seizures occur in around 2% of 5% of children and recurrence is seen in about one-third of children.[1,2]

One study done in rural South India showed prevalence of febrile seizures as found 3.28 to 5.71/1000.[3] Simple febrile seizures is a primary generalized, usually tonic-clonic, attack associated with fever,lasting for <15 min and not recurrent within 24 hr period. Complex febrile seizure (CFS) on the other hand is a focal, or generalized and lasting for more than 15 min, recurring more than once in 24 hours of duration, and/or associated with neurologic abnormalities." [4] Children aged below 12 months during the time of their 1st simple febrile seizure had around 50% probability of having recurrent febrile seizures. There is risk of death during a simple febrile seizure due to head injury, aspiration, or cardiac arrhythmia.[5] Certain studies showed that environmental and genetic factors affect the recurrence of febrile seizures. Previously young age was considered as the risk factor responsible for recurrence, but later, some other factors have also been identified.[6] Very few studies till now reported the risk factors of recurrence of febrile seizure from India. Therefore, the present study was conducted to know the risk factors associated with the recurrence of febrile seizures among South Indian children.

Objectives:
To know the incidence of recurrence of febrile seizures among children.
To study the risk factors of recurrent febrile seizures among children aged below 5 years.

II. Material And Methods

Study site: Department of Paediatrics, ASRAM, Eluru, Andhra Pradesh, India.

Study duration: Six months: January 2024 to June 2024

Sample size: 50

Type of study: Observational study

Ethical considerations:
Informed consent was taken from every parent of children who participated in the study.

Inclusion criteria:
- Male and female children aged 6 months to 5 years presenting to the department of pediatrics at our teratiary care center with febrile seizures.
- Parents who provided informed consent to participate in the study.

Exclusion criteria:

Children with unprovoked seizures, children with intracranial infections, children with any neurological abnormality.

Unprovoked seizures are seizures which occurs without any precipitating factors and they are caused by a static injury or a progressing injury.[7] Intracranial infection was detected if any microorganisms was cultured and identified from cerebrospinal fluid (CSF) and if a diagnosis was made when there is atleast one of the following features: Increased white cells, increased protein or reduced glucose on CSF examination, microorganisms on Gram stain of CSF, microorganisms seen cultured from blood, or positive antigen test of CSF, or urine or blood.[8]

Methodology: After the admission , informed consent was taken from patients or from their relatives/legally acceptable representatives. The questionnaire was administered by a single interviewer, a postgraduate student from the pediatrics department, to all participants in the study. It was translated into Telugu (the local language), and pretested prior to administration.

The first section of questionnaire included screening questions to confirm that the child had no history of unprovoked seizures. The interviewer also determined the type of febrile seizure, the seizure type, and the seizure classification.

Following the questionnaire, a comprehensive neurological examination was conducted, including assessments of motor and sensory functions, higher cognitive functions, walking, and coordination. Additional diagnostic tests, such as electroencephalography (EEG), cerebrospinal fluid (CSF) analysis, computed tomography (CT), and magnetic resonance imaging (MRI), were performed as needed to identify the underlying cause of the seizures.

Seizures were classified as complex if they were focal at onset, prolonged, or recurrence within 24 hours during the illness. Seizures that included secondary generalization were categorized as focal seizures. Focal seizures that progressed to generalized tonic-clonic convulsions were classified as secondarily generalized seizures, involving the entire brain bilaterally after initially affecting only one hemisphere.[9]

A seizure was deemed prolonged if it lasted more than 15 minutes.[10] Data were also gathered regarding the current illness, including the duration of fever before the seizure, the maximum recorded body temperature before or immediately after the seizure, and additional factors such as family history of febrile seizures. Temperatures were measured in degrees Fahrenheit using an analogue mercury thermometer.

Statistical analysis: Data were analyzed using SPSS 23.3 software. Mean, SD, percentages, and frequencies were used. Chi square test was used to know risk factors associated with recurrent seizures. P value below 0.05 is considered significant statistically.

III. Results

Incidence of recurrent febrile seizures:

Among 50 children included, 22 had recurrent febrile seizures and 28 had no recurrent febrile seizures. All parameters were compared among these two groups of children to detect risk factors associated with recurrent febrile seizures.

Age:

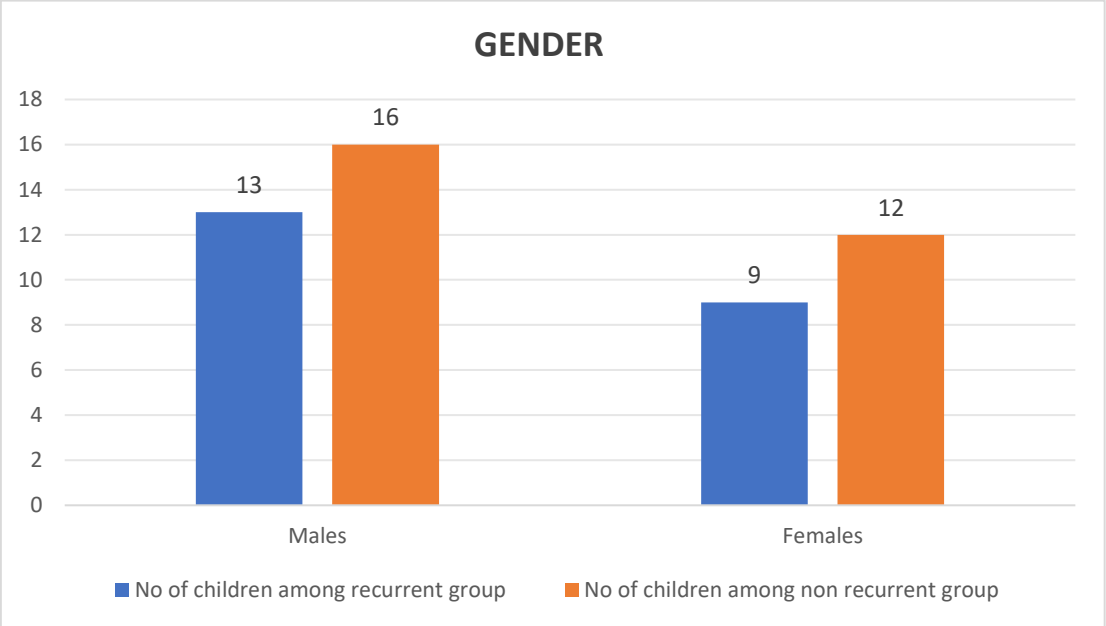
Age	No of children among recurrent group	No of children among non recurrent group	P value
Below 18 months	20	13	0.0001
Above 18 months	2	15	
TOTAL	22	28	

Table 1: Age of children

Gender: Overall 29 children were males among 50 included.
There is no significant difference in gender in between two groups. This implies that gender is not a risk factor.

Gender	No of children among recurrent group	No of children among non recurrent group	P value
Males	13	16	0.88
Females	9	12	
TOTAL	22	28	

Table 2: Gender of children



Graph 1: Gender of children

Duration of fever and temperature:

There is significant difference in duration of fever and temperature between two groups. This implies that fever less than 24 hours and temperature less than 102°F are risk factors for recurrent febrile seizures.

Duration of fever	No of children among recurrent group	No of children among non recurrent group	P value
Less than 24hours	20	17	0.015
More than 24 hours	2	11	
TOTAL	22	28	
Temperature	No of children among recurrent group	No of children among non recurrent group	P value
Below 102	19	13	0.013
Above 102	3	15	
TOTAL	22	28	

Table 3: Duration of fever and temperature

Family history of febrile seizures and epilepsy:

There is significant difference in family history of febrile seizures between two groups. This implies that family history of febrile seizures is a risk factor for recurrence of febrile seizures. There is significant association seen with family history of epilepsy.

Family history of febrile seizures	No of children among recurrent group	No of children among non recurrent group	P value
Yes	7	2	0.024
No	15	26	
TOTAL	22	28	
Family history of epilepsy	No of children among recurrent group	No of children among non recurrent group	P value
Yes	9	3	0.04
No	13	25	
TOTAL	22	28	

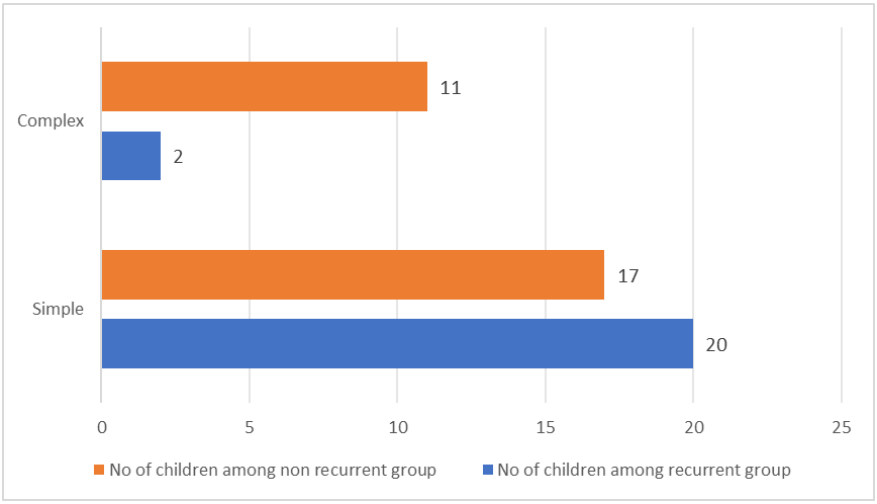
Table 4: Family history of febrile seizures and epilepsy

Type and duration of seizures:

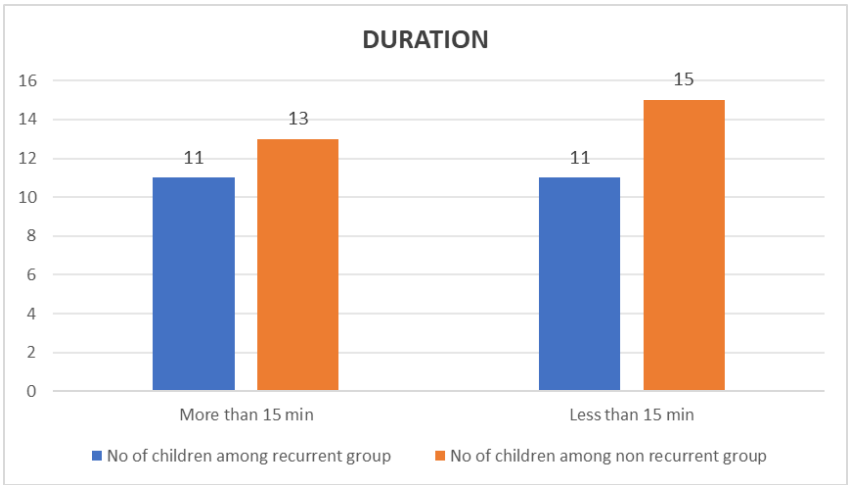
There is significant association between type of seizures with recurrence as evident from P values. Complex febrile seizures has more risk for recurrence of febrile seizures.

Type of seizures	No of children among recurrent group	No of children among non recurrent group	P value
Simple	11	26	0.01
Complex	11	2	
TOTAL	22	28	
Duration of seizure	No of children among recurrent group	No of children among non recurrent group	P value
More than 15 min	11	13	0.80
Less than 15 min	11	15	
TOTAL	22	28	

Table 5: Type and duration of seizures



Graph 2: Type of seizures



Graph 3: Duration of seizures

IV. Discussion

In the current study, recurrence of febrile seizures was seen in 44% of children aged 6 months to 5 years. These results were comparable with the studies of Berg et al. who reported recurrence among 27.1% children.[11] Others have found that there is a 15% to 70% risk of recurrence during 1st 2 years after 1st episode of febrile seizure.[1]

Current study showed that family history of febrile seizures, epilepsy, young age, temperature below 102°F, less duration of fever as risk factors for reccurence. In the study of Navneet e al. recurrence was seen commonly among children <18 months compared to children ≥18 months. Annegers et al. Identified that children aged below 12 months during their 1st episode were more likely to have recurrence.[12]

Children with a temperature below 102°F during the episode of seizure had a recurrence of 52.5% as per Navneet et al. This finding was comparable to the current study. One study done in Nepal also reported that low temperature during febrile seizure was significantly associated with recurrence of febrile seizures.[13]

In the present study, children with duration of fever <24 hr found to have significantly more risk of recurrence. Similarly, Nepal study showed that short duration of fever before onset of seizure was a risk factor for recurrence of seizures.[13]

Graves et al. reported that recurrence of febrile seizures was associated with children <18 months of age, children with low fever and lesser duration of fever before seizure onset, and children with a family history of febrile seizures.

There is significant association seen with family history of epilepsy in this study. Annegers et al. showed that children with a family history of epilepsy at at more risk of recurrence of seizures.[12]

Marudur et al. found that a temperature of <40°C during the febrile seizure, history of febrile seizures among 1st-degree relatives, age during the first febrile seizure of <12 months and duration of fever before the seizure of <1 h as significant risk factors for recurrence of febrile seizures.[14]

Limitations of the study:

History of vaccination was not elicited Iron deficiency was not assessed Single center study.

V. Conclusion

The current study revealed that younger age at onset of 1st episode of seizure, lower temperature during the episode, brief duration between onset of fever and 1st episode, and family history of febrile seizures were associated with recurrence of febrile seizures. These risk factors should be considered by the physician, while treating a child suffering from febrile seizures. Caregivers of children who are at high risk should be cautioned for long-term prophylaxis and increased vigilance during every episode of fever to prevent recurrence.

The study is self-sponsored.

There were no conflicts of interest.

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