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To Study the Hematological Parameters and Risk Factors Associated with Febrile Seizure in Children in Sri Siddartha Medical College and Hospital Tumkur

Dr. Shinoy S. Rasalam[1]*, Dr. Rangaswamy K. B[2], Dr. Kumar G.V[3], Dr. Arun Kumar G[4], Dr. Tibu John Joyse[1], Dr. Drishya Muraleedharan[1]

[1]Post Graduate, Department of Paediatrics, Sri Siddhartha Medical College, Tumkur, 83W5+296 Ssmc, Tumakuru, Karnataka 572107, India
[2]Professor, Department of Paediatrics, Sri Siddhartha Medical College, Tumkur, 83W5+296 Ssmc, Tumakuru, Karnataka 572107, India
[3]Professor And Head, Department of Paediatrics, Sri Siddhartha Medical College, Tumkur, 83W5+296 Ssmc, Tumakuru, Karnataka 572107, India
[4]Assistant Professor, Department of Paediatrics, Sri Siddhartha Medical College, Tumkur,83W5+296 Ssmc, Tumakuru, Karnataka 572107, India

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*Corresponding Author

Dr. Shinoy S. Rasalam

Post Graduate, Department of Paediatrics, Sri Siddhartha Medical College, Tumkur, 83W5+296 SSMC, Tumakuru, Karnataka 572107, India

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A B S T R A C T

Background: Febrile seizure is the common type of seizure disorder of childhood occurs in an age-specific manner, usually between 6 months to 5 years of age. It is associated with a fever of temperature 38.0°C or higher, and presents without any evidence of definite causative diseases, such as metabolic abnormality or central nervous system (CNS) infection. Febrile seizure may be simple or complex. The prevalence of febrile seizures among different communities is between 2-4%, About 4 out of 10 children who had febrile seizure will get them later at some stage, although the risk factors differ from one child to other child. In most of the patients, fever is due to upper respiratory system and urinary tract infection. ***Objectives:*** 1) To identify the Risk factors associated with febrile seizure. 2) To analyse the CBC and CRP levels in febrile seizure. ***Methodology*:** This study was a cross sectional study. All the In patient and Outpatient children in the department of paediatrics who are diagnosed with febrile seizure and satisfying inclusion criteria was enrolled for the study after obtaining the written informed consent at Sri Siddhartha Medical College And Research Centre, Tumkur. The sample size considered is 70 cases. The study included children aged between 6 months to 5 years of age and excluded the children with seizures other than febrile seizure. ***Results:*** The study included 75 children with febrile seizure, Majority of the population had high grade fever (> 101 F). In this present study URTI was found to be the cause the fever leading to the seizures, almost all the children presented with GTCS. Only two had partial convulsions. The onset of seizure was within 24 hours of the onset of the febrile episode in 43/75children. There was a positive family history in 22/75 patients. The correlation of the previous history and the type of seizure, there was no significance. 40/75 of the patients had features of anaemia. The association with type of seizure was found to be statistically significant. In more than half the patients, we noted an elevated total leucocyte count. In 2/3rd of the patients, CRP was observed to be elevated. ***Conclusion:*** The most prevalent kind of febrile seizure was the simple febrile seizure. While a minority had positive family history and past history, we noted that majority had coryza that triggered the episode. Anaemia was also identified to be a significant risk factor for our study.

Keywords: Seizure, Electrolytes, Febrile.

INTRODUCTION

Febrile seizures (FS) represent one of the most prevalent neurological disorders affecting young children, characterized by convulsions triggered by fever in the absence of central nervous system infections. Globally, the prevalence of febrile seizures is estimated to range from 2% to 12% in paediatric populations, with higher rates reported in certain regions, particularly in Asia [3, 5, 6]. These seizures predominantly occur in children aged between 6 months and 5 years, peaking around 12 to 18 months of age [3]. In India, the situation is particularly pressing; studies indicate that the incidence of febrile seizures can reach as high as 14% in specific cohorts [4]. Given the diverse socio-economic landscape and varying health infrastructure across the country, there is an urgent need for context-specific data to guide effective public health strategies.

The implications of febrile seizures extend beyond the immediate clinical episode. Research suggests that recurrent febrile seizures may have long-term consequences on cognitive and neurological development [2, 5]. Understanding and identifying modifiable risk factors associated with febrile seizures is essential for developing preventive measures and improving outcomes for affected children. This study aims to explore these risk factors within a tertiary care hospital setting in India, contributing valuable insights to a field that remains under-researched in this context.

Defining Febrile Seizures and Clinical Relevance

Febrile seizures are classified into two main categories: simple and complex. Simple febrile seizures are characterized by generalized tonic- clonic activity lasting less than 15 minutes and occurring only once within a 24-hour period. In contrast, complex febrile seizures may involve focal features, prolonged duration, or multiple occurrences within a short time frame [3, 4]. The pathophysiology underlying these seizures is multifactorial, involving genetic predispositions, environmental triggers such as viral infections, and individual variations in seizure thresholds [2, 3].

Typically, febrile seizures occur in children aged between 6 months and 5 years, with a notable increase in incidence during the first two years of life. Early detection and understanding of the risk factors associated with febrile seizures are critical for timely intervention and management [1, 2].

Rationale and Importance of Studying Risk Factors

The etiology of febrile seizures is complex and multifactorial, influenced by genetic, environmental, and sociodemographic factors. Identifying these risk factors is crucial for several reasons. Firstly, it enhances our understanding of the conditions underlying mechanisms. Secondly, it addresses the challenges faced by healthcare providers in predicting and preventing future episodes. Current clinical guidelines often lack specificity regarding which children are at higher risk for recurrent febrile seizures [5, 6].

Moreover, identifying modifiable risk factors can lead to targeted interventions that may reduce the incidence of febrile seizures in high-risk populations. For instance, understanding how nutritional deficiencies or specific viral infections contribute to seizure risk can inform public health initiatives aimed at improving child health outcomes [4, 6].

Knowledge Gap and Justification of the Study

Despite the high prevalence of febrile seizures in India, there remains a significant lack of comprehensive data on this condition within the country's healthcare system. Most existing studies are limited in scope or focus on specific geographical areas without providing a broader understanding applicable to diverse populations [4, 5]. This study seeks to fill this gap by focusing on a tertiary care hospital setting where a wide array of cases can be analyzed.

Additionally, contextualized data is essential for understanding how regional factors—such as socioeconomic status, genetic predispositions, and environmental conditions—affect the incidence and characteristics of febrile seizures. Insights gained from this research could have far-reaching implications for clinical practice in Indian tertiary care centers and inform public health policies aimed at reducing the burden of febrile seizures across various demographics.

Study Objectives and Scope

The primary objective of this study is to analyze and identify key risk factors associated with febrile seizures in children admitted to a tertiary care hospital in India. The scope encompasses a comprehensive dataset that includes demographic information, clinical presentations, laboratory findings, and family histories to provide a holistic view of the condition.

By focusing on this specific setting and population group, we anticipate that our findings will contribute significantly to enhancing patient care strategies while informing prevention efforts tailored to high-risk paediatric populations. Ultimately, this research aims to empower healthcare professionals with knowledge that can lead to improved outcomes for children experiencing febrile seizures.

AIM

To study the haematological parameters and risk factors associated with febrile seizure in children in Sri Siddhartha Medical College and Hospital, Tumkur.

OBJECTIVES

1. To identify the Risk factors associated with febrile seizure.
2. To analyze the relation between CBC and CRP levels in febrile seizure.

MATERIALS AND METHODS

All the Inpatient and Outpatient children in the department of paediatrics who are diagnosed with febrile seizure and satisfying inclusion criteria was enrolled for the study after obtaining the written informed consent at Sri Siddhartha Medical College and Research Centre, Tumkur. It was a cross-sectional study with a sample size of 70.

Inclusion Criteria:

1. Children from age group 6months to 5years
2. Children with fever and seizure
3. Children with family history of seizure disorders (febrile seizure)
4. Children with previous history of febrile seizure

Exclusion Criteria:

1. Not giving consent
2. Seizure not associated with fever
3. Children with CNS infections
4. Children with underlying neurological abnormality detected after evaluation of current episode.

Methods of Collection of Data

- Children fulfilling the inclusion criteria were selected.
- Detailed history was taken from parent
- Relevant blood investigation was sent.

RESULTS

Table 1: Etiology of fever

ETIOLOGY OF FEVER	FREQUENCY	PERCENTAGE
URTI	53	70.67
PNEUMONIA	1	1.33
GE	2	2.67
OTITIS MEDIA	3	4
UTI	8	10.67
NOTIDENTIFIED	8	10.67

In this present study URTI was found to be the leading cause of fever resulting in seizures. In 8/75 children, no cause was identifiable. The remaining etiologies were spread out amongst pneumonia, GE, otitis media and UTI.

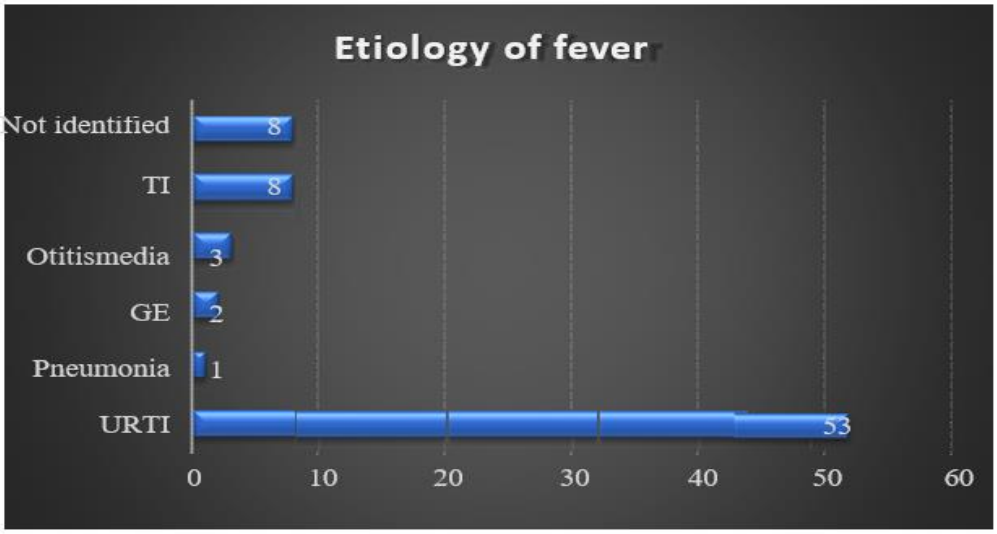

Figure1: Bar graph showing etiology of fever

Table 2: Onset of seizure with regards to duration of fever

ONSET OF SEIZURE	Simple Febrile Seizure	Complex Febrile Seizure	P value
WITHIN 24 HOURS	70	1	0.003
AFTER 24 HOURS	3	1	
TOTAL	73	2	

There was a significant association between onset of seizure, nature of seizure and the type of seizure.

Table 3: Types of febrile seizures

NATURE	GTCS	PARTIAL	P VALUE
SIMPLE	74	1	0.002*
COMPLEX	1	1	

Table 4: Family history of febrile seizure

Family History of Febrile Seizure	Frequency	Percentage
Yes	22	29.33
No	53	70.67

There was a positive family history in 22/75 patients i.e., 29.33% had febrile seizure history in the family

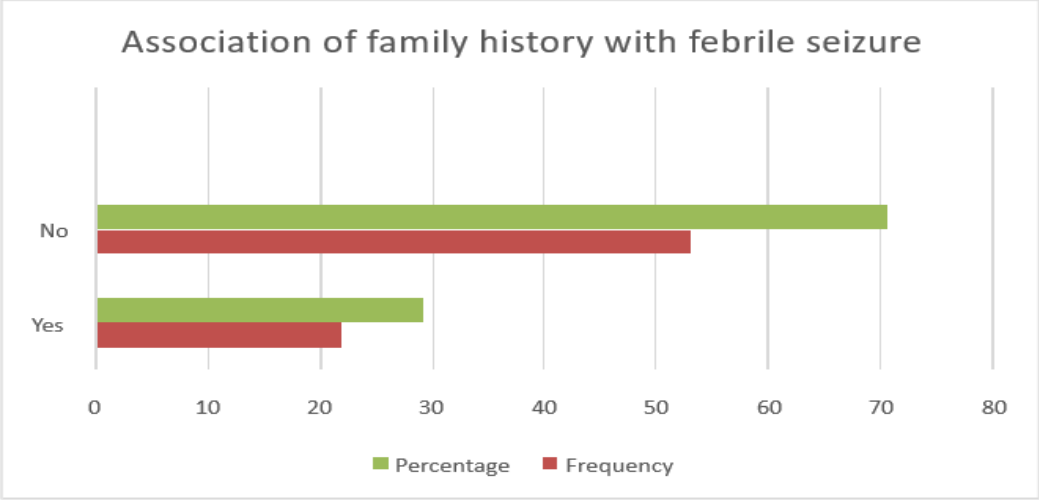

Figure2 : Bar graph showing association of family history with febrile seizure

Table 5: Previous history of febrile seizure

PREVIOUS HISTORY	FREQUENCY	PERCENTAGE
YES	17	22.67
NO	58	77.33

There was no significant correlation between the previous history and the occurrence of seizure (p 0.893).

Table 6: Relation of haemoglobin levels with febrile seizure

HAEMOGLOBIN	GTCS	PARTIAL	P VALUE
NORMAL	**34**	**0**	**<0.001**
LOW	**40**	**2**	

40/75 of the patients had features of anemia. The association with type of seizure was found to be statistically significant.

Table 7: WBC values of children with febrile seizure

WBC	FREQUENCY	PERCENTAGE
Normal	27	36
High	48	74
Low	0	0

In more than half of the patients, we noted an elevated total leucocyte count which is shown in the bar chart below.

Table 8: Lymphocyte levels in children with febrile seizure

LYMPHOCYTE	FREQUENCY	PERCENTAGE
NORMAL	**35**	**46.67**
HIGH	**36**	**48**
LOW	**4**	**5.33**

In half the patients, it was observed that the leucocytosis was of lymphocyte predominance, which was suggestive of a viral etiology.

Table 9: Platelet count of children with febrile seizure

PLATELET	FREQUENCY	PERCENTAGE
NORMAL	72	96
HIGH	2	2.67
LOW	1	1.33

In majority of the patients, platelets were found to be normal

Table 10:Relation of CRP values with febrile seizure

CRP	Simple Febrile Seizure	Complex Febrile Seizure	P Value
NORMAL	12	2	0.003
HIGH	53	0	

In 2/3rd of the patients, CRP was observed to be elevated. CRP is an acute inflammatory marker, hence febrile seizure might have an underlying inflammatory pathology showing a statistical significance (p value 0.003).

Table 11: Relationship of breast feeding with febrile seizure

EBF	FREQUENCY	PERCENTAGE
YES	**60**	**80**
NO	**15**	**20**

15/75 children were not exclusively breastfed in our study whereas 60/75 were exclusively breast fed.

Table 12: Associated symptoms and febrile seizure

OTHER SYMPTOMS	Simple Febrile Seizure	Complex Febrile Seizure
COUGH	**44**	**2**
CORYZA	**44**	**2**
LOOSE STOOL	**0**	**0**
DYSURIA	**4**	**0**
ABDOMINALPAIN	**9**	**0**
COUGH+CORYZA	**18**	**2**
ABDOMINALPAIN+ DYSURIA	**3**	**0**

Along with fever, the children had associated cough and coryza. This was found to be the main trigger factor for FS and we have found a statistically significant correlation (r 0.731, $p < 0.001$).

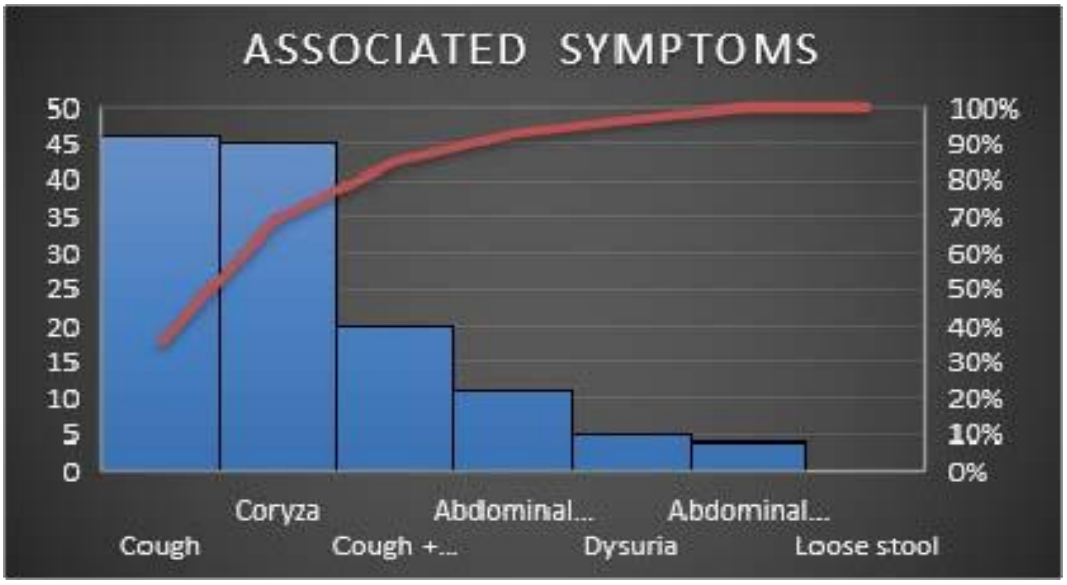

Figure 3: Bar graph showing relation of associated symptoms with febrile seizure

DISCUSSION

In children under the age of five, the most frequent form of seizure is known as a febrile seizure. This type of seizure is characterised by the presence of fever in conjunction with the seizure, but there is no indication of a cerebral infection or an acute electrolyte imbalance when the seizure occurs [8]. There are a number of important worries that parents have regarding the long-term repercussions of febrile seizures, including the possibility of epilepsy and the recurrence of seizure episodes. In an effort to determine the elements that are connected with recurrence, attempts have been made. The recurrence was shown to be connected with the initial episode of febrile seizure occurring less than a year ago, complicated febrile seizure, a family history of the condition, and a fever that was lower than 40 degrees Celsius [9]. The age range of simple FS is traditionally regarded as being between six and sixty months. A person's second year of life is often when the incidence is at its highest. In children aged 0 to 4 years old, the total incidence of FS is estimated to be 460 per 100,000 people. This means that FS can be found in as many as five percent of children [10]. The majority of FS are straight forward; but, up to thirty percent of them could include some complicated aspects. There are a number of characteristics that are associated with the probability of recurrence of FS. These factors include a younger age group, longer seizure duration, degree of fever, and a positive personal and family history of FS. A positive family history of FS in first-degree relatives is seen in as much as forty percent of patients, according to the latest research.

Seizure Noted When

In our study, majority of the patients had high fever, and presented with seizures within 24 hours of onset of the same.

According to the findings of the Sharawat *et al*., and Kumar *et al*., study, children who have repeated febrile seizures have a lower fever when they are presented with their symptoms than children who experience their first febrile seizure.

STUDIES	**<24 hours**	**24 hours**
PRESENT	71	4
Priyanshibhen [7]	68.75	31.25
Sharawat*et al*., [8]	45	25

FAMILYHISTORYANDRECURRENCE

There was a positive family history in 22/74 patients in the present study, while is17 patients there was a past history of FS.

In Raju V *et al*., when compared with the controls, it was discovered that 33 percent of our patients had a family history of FSs, and this finding was deemed to be statistically significant (p value = 0.0008).

STUDIES	Family History	Recurrence
PRESENT	22/75	17/75
Raju [14]	33%	-
Priyanshibhen [7]	17.5%	-
Kumar [9]	34%	-

In line with the findings of those research that demonstrated significant evidence of a positive family history as a risk factor for febrile seizures, our conclusion is in keeping with those studies. Additionally, a family history of epilepsy was discovered to be a risk factor for FSs (p value 0.029), which was another result of the study [16-18].

TRIGGERS/INCITINGFACTORS

In majority of our study population, they had coryza preceding the fever and FS. Raju V *et al*., [14]in line with our study, found that respiratory illnesses were identified to be a risk factor for FSs. These diseases were confirmed to be the source of fever.

STUDIES	TRIGGERINGFACTOR	ANAEMIA
PRESENT	CORYZA	42/75
Raju [14]	RESPIRATORY ILLNESS	-
Priyanshibhen [7]	URTI (70%)	73.75%
Barui [10]	-	67.04%

ANAEMIA

In our study, majority of the study population had underlying anaemia, which may increase the risk of FS in such children.

Similarly, in Raju V *et al*., a high proportion of the children who participated in our research were anaemic, and when compared with the control group, it was discovered that anaemia was a significant risk factor (p-value 0.001). The relationship between iron deficiency anaemia and FSs has been investigated by a large number of writers. While some of these authors have confirmed the existence of this association, others have come to the conclusion that the risk of FSs occurring in children who suffer from anaemia appears to be lower than in children who do not suffer from anaemia [14-16].

CONCLUSION

The most prevalent kind of febrile seizure was the simple febrile seizure, and the majority of people who experienced febrile seizures were children younger than three years old and were males. While a minority had positive family history and past history, we noted that majority had Coryza that triggered the episode. Anaemia was also identified to be a significant risk factor for our study.

In children who are prone to develop febrile seizures, early detection of high-grade fevers can help us anticipate the progression to it and help provide the necessary medications and steps required to prevent further episodes of febrile seizures.

Conflict of Interest and Financial Support: NIL

Ethical Approval: The study was approved and ethical clearance taken from the Ethics committee, Sri Siddhartha Medical College, Tumkur, Karnataka.

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