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### Corresponding Author

Chandrakanth Mahale,  
BGS Global Institute of Medical  
Science, India  
kidsicare67@yahoo.com

### Author Designation

<sup>1</sup>Assistant Professor  
<sup>2</sup>Associate Professor  
<sup>3</sup>Chairman  
<sup>4</sup>Retired Professor and HOD

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## Study of Incidence of Bacteremia in Febrile Seizures in Pediatric Patients at a Tertiary Hospital

<sup>1</sup>L. Chairman Muthu Prem Kumar, <sup>2</sup>Chandrakanth Mahale, <sup>3</sup>Ravi Sahota and <sup>4</sup>Sam Ahuja

<sup>1</sup>Department of Paediatrics, Government Thoothukudi Medical College, Thoothukudi, India

<sup>2</sup>BGS Global Institute of Medical Science, India

<sup>3</sup>Sahota Superspeciality Hospital, Kashipur Uttarakhand, India

<sup>4</sup>Dr. B R Ambedkar Medical College, India

### Abstract

It was not until 1980 that febrile seizures were recognized as a distinct clinical entity, separate from other types of convulsions in early childhood. Present study was aimed to study incidence of bacteremia in febrile seizures in pediatric patients at a tertiary hospital. Present study was single-center, prospective, comparative, parallel-group, observational study, conducted in neurologically normal children in the age group of 3 month-6 years admitted to pediatric emergency ward with history of fever with convulsions. Among 54 children in the study group, 14 (25.92%) of them were between the age group of 3-12 months, 22 (40.74%) of them were between 13-24 months. Most of the children in the study group were below 24 months of age (66.66%). Among the 54 children studied, febrile convulsion was noticed in 31 males (57.40%) and 23 females (42.59%). Common Presenting complaints were rhinorrhea (59.25%), cough (31.48%), loose stools (24.07%), vomiting (1.8%) and rashes (1.8%). In the study group of 54 children, 49 cases had Typical febrile convulsions which lasted for less than 15 minutes and 5 cases had Atypical febrile convulsions which lasted for more than 15 minutes. Family history of convulsions was positive in 14 cases of the 54 cases of which 9 had family history of febrile convulsions and 5 had family history of epilepsy. Most of the cases (87%) showed no growth in blood culture. Blood culture yielded growth in 7 cases. One growth was Streptococcus Pneumonia and the rest were Coagulase negative staphylococcus aureus (contaminant). Even though viruses form major etiological agents for febrile convulsions, occult bacteremia should be ruled out in all children presenting with febrile convulsions.

## INTRODUCTION

It was not until 1980 that febrile seizures were recognized as a distinct clinical entity, separate from other types of convulsions in early childhood<sup>[1]</sup>. International League Against Epilepsy (1993) defines an Febrile Seizure as “a Seizure occurring in childhood between 1 month and 5 years of age, associated with Febrile illness not caused by an infection of the Central Nervous System, without previous neonatal seizures or a previous unprovoked seizure and not meeting criteria for other acute symptomatic seizure”<sup>[2]</sup>.

An axillary temperature of more than 38°C as a simple cut off level is considered during diagnosis of a febrile seizure, but there is still not consensus<sup>[3]</sup>. Between 2-5% of children in Europe and US experience at least one Febrile Seizure before the age of 5 yrs., being more common in boys<sup>[3,4]</sup>.

Indian studies suggested that up to 10% of children experience a Febrile Seizure. Recent data indicate that the incidence rate in India is similar to western countries<sup>[6]</sup>. Febrile Seizures tend to occur in families and this genetic susceptibility can be transmitted through both parents<sup>[7]</sup>. A positive family history for Febrile seizures can be elicited in 25-40% of children with febrile seizures and the reported frequency in their sibling ranges from 9-22%<sup>[7]</sup>. Present study was aimed to study incidence of bacteremia in febrile seizures in pediatric patients at a tertiary hospital.

## MATERIALS AND METHODS

Present study was single-center, prospective, observational study, conducted in Department of Pediatrics at Dr. B.R. Ambedkar Medical college, Bengaluru, 560045, India. Study duration was of 2 years (November 2009 to September 2011). Study approval was obtained from institutional ethical committee.

### Inclusion Criteria:

- Neurologically normal children in the age group of 3 month-6 years admitted to pediatric emergency ward with history of fever with convulsions, parents willing to participate in present study.

### Exclusion Criteria:

- Who have history of Afebrile Seizures.
- Those who have received antibiotics prior to hospitalization.
- Past history of Neonatal Seizures.
- Static/Progressive neurological disorder.

Study was explained to parents in local language and written consent was taken for participation and study. Clinical History such as patients Name, Age, Sex. History of fever, History of precipitating factors (like URTI, LRTI, AGE, UTI, Ear Infection etc.), Duration of convulsion, Type of convulsion, Frequency of convulsion, Family history of Febrile Seizure, Epilepsy. History of Birth Asphyxia/developmental delay was noted. A detailed general and systemic examination was done in all cases to find out the foci of infection.

Necessary investigations were done by obtaining informed consent from the patient's parents. Investigations done were Complete blood count, Peripheral blood smear, Blood culture and sensitivity, Urine routine and microscopy, culture and sensitivity (if required), Stool routine and microscopy, culture and sensitivity (if required), CSF analysis (in Children <18 months of age, Undue or unexplained drowsiness or irritability)

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

## RESULTS AND DISCUSSIONS

Among 54 children in the study group, 14(25.92%) of them were between the age group of 3 -12 months, 22 (40.74%) of them were between 13-24 months. Most of the children in the study group were below 24 months of age (66.66%). Among the 54 children studied, febrile convulsion was noticed in 31 males (57.40%) and 23 females (42.59%). Most of the children in the study group were Hindus 27 (50%) and Muslims 25 (46.29%).

**Common Presenting complaints** were rhinorrhea (59.25%), cough (31.48%), loose stools (24.07%), vomiting (1.8%) and rashes (1.8%).

In the study group of 54 children, 49 cases had Typical febrile convulsions which lasted for less than 15 minutes and 5 cases had Atypical febrile convulsions which lasted for more than 15 minutes.

Family history of convulsions was positive in 14 cases of the 54 cases of which 9 had family history of febrile convulsions and 5 had family history of epilepsy.

Most of the cases (87%) showed no growth in blood culture. Blood culture yielded growth in 7 cases. One growth was Streptococcus Pneumonia and the rest were Coagulase negative staphylococcus aureus (contaminant).

The National Institute of Health Consensus Statement (1980) defines A Febrile Seizure as “an event in infancy or childhood usually occurring between 3 months and 5 years of age, associated with fever but without evidence of intracranial infection or defined cause for the Seizure”<sup>[1]</sup>.

**Table 1: General characteristics**

	No. of patients	Percentage
<b>Age in months</b>		
3-12	14	25.92
13-24	22	40.74
24-36	08	14.81
36-48	05	9.25
48-60	05	9.25
<b>Sex</b>		
Male	31	57.40
Female	23	42.59
<b>Religion</b>		
Hindu	27	50
Muslim	25	46.29
Christian	02	3.71

**Table 2: Presenting complaints**

Symptoms	No. of cases (n = 54)	Percentage
Rhinorrhea	32	59.25
Cough	17	31.48
Loose stools	13	24.07
Vomiting	01	1.8
Rashes	01	1.8

**Table 3: Duration of convulsions**

Duration of convulsions	No. of cases (n = 54)	Percentage
Less than 15 mins	49	90.74
More than 15 mins	05	9.26

**Table 4: Family history of convulsions**

Family history of febrile convulsions	No. of cases (n = 54)	Percentage
Positive	14	25.92
Negative	40	74.07

**Table 5: Organisms isolated in blood culture:**

Blood culture	No. of cases(n = 54)	Percentage
No growth	47	87
Bacteremia	07	13
Streptococcus pneumonia	01	1.85
Coagulase negative Staphylococcus	06	11.1

### Types of Febrile Seizure Can be Simple and Complex:

A simple Febrile Seizure is a generalized seizure (without focal features) which lasts less than 15 min and occurs only once during a 24-hour period of fever in a neurologically normal child<sup>[7]</sup>.

A complex Febrile Seizure is defined as a Febrile Seizure with one or more of the following features.

- A focal onset or shows focal features during the seizure or is followed by a neurological deficit or.
- Prolonged duration (>15 min).
- Recurrent within 24 hour or within the same febrile episode.
- The child has a previous neurological impairment.

In the present study the majority of cases were seen in the age group of 13-24 months. Incidence of infection is also more in this age group because of immaturity of the immunological function. As the age increases the incidence of febrile convulsions were less which can be explained by the fact that maturity and myelination of brain progressively increases. Similar findings were noted by Nelson K.B and Ellenberg J.H

(NCCP study)<sup>[8]</sup>, average age of onset was 23.3 months, Rutter N<sup>[9]</sup>. (mean age at presentation 23.5 months), Hirtz<sup>[10]</sup> (average age of onset 18-22 months) and Amerendra<sup>[11]</sup> (common age group 1-3 yrs).

In the present study, febrile convulsions were noticed in 31 males (57.40%) and 23 females (42.59%), the ratio being 1.3: 1. Similar findings were noted by Nelson K.B and Ellenberg J.H (NCCP study)<sup>[8]</sup> (More common in boys compared to girls, 36.6 Vs 32.8/ 1000 for whites and 46.4 Vs 38.5/ 1000 for blacks), Amarendra<sup>[11]</sup> (males 61% Vs females 39%).

Among the symptoms, Rhinorrhea, cough and diarrhea were significant. Vomiting and rash occurred in 1 case each. The majority of symptoms were of the upper respiratory tract. Similar findings were noted by Nelson K.B and Ellenberg J.H (NCCP study)<sup>[8]</sup> (38% Upper Respiratory tract infection, 23% Otitis Media, 15% Pneumonia, 7% acute Gastroenteritis, 5% Roseola Infantum, 12% other ailments), Amarendra<sup>[11]</sup> (86% Upper respiratory tract infection, 8% Acute Gastroenteritis).

Of the 54 cases, 47 cases did not yield any growth on blood culture. Of the 7 cases with bacteremia, only 1 case had significant bacteremia which had Streptococcus Pneumonia as the infecting organism. The other 6 cases, grew Coagulase negative Staphylococcus Aureus as the organism which was a contaminant.

The child with significant bacteremia with Streptococcus Pneumonia as the infecting organism also had Leukocytosis with Neutrophilia, toxic granules in neutrophils. The child with significant bacteremia was in the age group of less than 2 years. Studies by Mc Intyre<sup>[12]</sup> have also shown most of children with bacteremia were in less than 2 years.

Though majority of febrile convulsions are due to viral infection, occult bacteremia forms a small but significant percentage in children presenting with febrile convulsions, especially those less than 2 years. Similar findings were noted by Helen M. Lewis<sup>[13]</sup>, U.K., 1976-77 (86% viral etiology), Mc Intyre P. Kennedy. R and Harris. F. U.K 1980-82 (2.3% Occult bacteremia, 28% Enterobacteriaceae, 26% Strep. Pneumoniae, 20% Staph. Aureus).

Both total WBC count and Neutrophil count were found to be elevated in 30 cases (55.55%) out of 54 cases. Mc Intyre have shown leukocytosis was a sensitive (75%) diagnostic aid but was poorly specific (57%) for bacteremia.

The risk of child developing epilepsy at a later age is more with a family history of afebrile convulsions. Studies by Nelson K.B and Ellenberg J.H<sup>[14]</sup> has shown that children with febrile convulsions who have a positive family history of afebrile seizures was

associated with a 3-fold increase in the rate of later epilepsy, as compared with those with no family history of seizures. The same study also has shown the increase in risk of epilepsy associated with a positive family history of febrile seizures was not marked unless there was a previous neurologic abnormality or a lengthy focal or multiple first seizure in the proband<sup>[11]</sup>.

Those children who had a possible family history of afebrile seizures need to be followed up and evaluated more closely in future, based on these evidences. Since the children in the study group (54) were less in number, there is a need to study large number of children with febrile convulsions to find out the possible role of bacterial infection in the occurrence of febrile convulsions especially in those children less than 2 years of age.

### CONCLUSIONS

Even though viruses form major etiological agents for febrile convulsions, occult bacteremia should be ruled out in all children presenting with febrile convulsions. *Streptococcus pneumoniae* was the organism isolated in a child with febrile convulsion with significant bacteremia who had respiratory tract infection.

Children with a positive family history of afebrile convulsion has to be followed up and evaluated closely as they can develop epilepsy at a later date. The children who presented to us with febrile convulsions especially with gastroenteritis, none of them had large number.

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