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## A study on febrile convulsions with special reference to incidence of bacteremia

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### Abstract

**Background:** Febrile seizures is considered a "syndrome" because it fulfils several characteristics that are similar among affected children. Febrile Seizure generally occurs within a restricted age range. The majority of children with Febrile Seizure show normal neurological and structural development after the episode.

**Objectives:** To evaluate risk of bacteraemia and other factors for febrile seizures.

**Methods:** The present study conducted in Department of Paediatrics at Kakatiya Medical College/Mahatma Gandhi Memorial Hospital-Warangal, January 2019 to December 2020, 50 children in the age group of 06 months to 5 years with febrile seizures were studied. It is a prospective observational study so no potential risk is involved in this study.

**Results:** In this study of the 50 cases, 46 cases did not yield any growth on blood culture. Of the 04 cases with bacteremia, only 03 cases had significant bacteremia which had 02 *Streptococcus pneumoniae* as the infecting organism and 01 *H. Influenza*. The other 01 case grows coagulase negative *Staphylococcus aureus* as the organism which was a contaminant.

**Conclusion:** Even though viruses form major etiological agents for febrile convulsions, occult bacteraemia should be ruled out in all children presenting with febrile convulsions. Children with a positive family history of afebrile convulsion should be followed up and evaluated closely as they can develop epilepsy at a later date.

**Keywords:** bacteraemia, febrile seizures, epilepsy, occult

### 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>.

There are 4 operational definitions of febrile seizures<sup>[1,2]</sup>.

The National Institute of Health Consensus Statement (1980) defines Febrile Seizure as "an abnormal, sudden, excessive electrical discharge of neurons (grey matter) that propagates down the neuronal processes (white matter) to affect an end organ in a clinically measurable fashion, occurring in infancy or childhood, usually between 3 months and 5 years of age, associated with fever, but without evidence of intracranial infection or defined cause"<sup>[1]</sup>.

International League Against Epilepsy (1993)<sup>[2]</sup> defines an Febrile Seizure as "a Seizure occurring in childhood after age 1 month, 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>.

Indian academy of paediatrics "Febrile seizures are defined as an event in neurologically healthy infants and children between 6 months and 5 years of age, associated with fever >38°C rectal temperature but without evidence of intracranial infection as a defined cause and with no history of prior afebrile seizures".

American academy of paediatrics-AAP defined Febrile Seizure as a seizure occurring in febrile children between the ages of 6 and 60 months who do not have an intracranial infection, metabolic disturbance, or history of afebrile seizure.

Febrile seizures is considered a "syndrome" because it fulfils several characteristics that are similar among affected children:

Febrile Seizure generally occurs within a restricted age range.

The majority of children with Febrile Seizure show normal neurological and structural development after the episode.

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Febrile Seizure is not associated with structural or developmental anomalies in the brain, although the existence of such pathology may enhance susceptibility to Febrile Seizure.

Genetics, co-morbidities (premature birth, fetal growth retardation), and environmental risk factors (exposure to nicotine in utero, or antihistamine use) may increase risk of Febrile Seizure in addition to the age factor.

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 no consensus [3].

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 [4, 5].

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 [6].

**Materials and Methods**

**Source of data**

Patient who will be admitted in Department of Paediatrics, Kakatiya Medical College/Mahatma Gandhi Memorial Hospital-Warangal, with History of fever and convulsions.

**Study duration:** January 2019 to December 2020.

**Sample size:** 50

**Inclusion criteria**

Neurologically normal children in the age group of 6 months to 5 years presenting to the hospital with febrile convulsions.

**Exclusion criteria**

- Those who have received antibiotics prior to hospitalization.
- Past history of neonatal seizures.
- Static or progressive neurological disorder.

**Study design**

- It is a prospective observational study.
- No potential risk is involved in this study.

**Statistical analysis**

Demographic profile of the patients were expressed in using SPSS 21 software in the form of tables. Detailed History including clinical examination was done on all patients. Data including symptoms, family history, duration of convulsions was noted down. The blood culture was done on all patients.

**Ethical clearance**

Ethical Clearance was taken from the institution ethical clearance committee prior to the commencement of the study.

**Observation and Results**

**Table 1:** Distribution of cases based on gender, age group, symptoms and family history

Sex of the child	No. of cases (n = 50)	Percentage
Male	28	56%
Female	22	44%
<b>Age in months</b>		
6-12	13	26%
13-24	22	44%
25-36	08	16%
37-48	05	10%
49-60	02	04%
<b>Symptoms and signs</b>		
Rhinorrhoea	36	72%
Cough	21	42%
Loose stools	14	28%
Vomiting	03	06%
Rashes	05	10%
Otitis media	07	14%
UTI	08	16%
Lymphadenopathy	03	06%
<b>Family history</b>		
Positive	09	18%
Negative	41	82%

Among the 50 children studied, febrile seizures was noticed in 28 males (56%) and 22 females (44%). Majority around 13 (26%) of them were between the age group of 6 months to 12 months, 22 (44%) of them were between 13 months to 24 months. Most of the children in the study group were below 24 months of age i.e. 35 children (70%).

Rhinorrhoea was the most common symptom seen in majority of the cases around 36 children (72%), cough in 21 children (42%), Loose stools in 14 children (28%), Vomiting in 03 children (06%), rashes in 05 children (10%), otitis media in 07 (14%), Urinary tract infection in 08 (16%) and lymphadenopathy in 03 (06%).

Family history of convulsions was positive in 09 (18%) of the 50 cases and 41 (82%) of cases had a negative family history.

**Table 2:** Distribution based on duration of convulsions

Duration of convulsions	No. of cases (n = 50)	Percentage
Less than 15 mins	45	90%
More than 15 mins	05	10%

In the study group of 50 children, 45 (90%) cases had typical febrile seizures which lasted for less than 15 minutes

and 05 (10%) cases had atypical febrile convulsions which lasted for more than 15 minutes.

**Table 3:** Percentage of cases with organisms isolated in blood culture

Blood culture	No of cases (n = 50)	Percentage
No growth	46	92%
Bacteremia	04	08%

Out of the 50 cases studied, blood culture yielded growth in 04 cases. Most of the cases 46 (92%) showed no growth in blood culture.

Only 2 (4%) cases showed growth of *Streptococcus Pneumoniae* and 1 case showed *H. Influenza* (2%) and another 1 case Coagulase negative *staphylococcus aureus* 1 (2%) - (? contaminant).

**Table 4:** Organisms isolated in blood culture

Organism	No. of cases	Percentage
Coagulase negative <i>staphylococcus</i>	1	2% (Contaminated)
<i>Streptococcus pneumonia</i>	2	4%
<i>H. nfluenza</i>	1	2%

**Table 5:** Characteristics of the child who had significant Bacteremia

Age/sex	Symptoms	TC	CRP	Organism	CSF
24/M	Fever, cold, cough and rash	18500	+ve	<i>Streptococcus pneumoniae</i>	N
36/F	Fever, cold, cough and earache	6800	-ve	Coagulase. neg. staph. aureus (? contaminated)	N
10/F	Fever, cold and earache	21300	+ve	<i>Streptococcus pneumoniae</i>	N
17/M	Fever, cold and cough	19600	+ve	<i>H. Influenza</i>	N

**Discussion**

In the present study conducted in Department of Paediatrics at Kakatiya Medical College/Mahatma Gandhi Memorial Hospital - Warangal, January 2019 to December 2020, 50 children in the age group of 06 months to 5 years with febrile seizures were studied. Observations have been made and compared to the similar studies which were done earlier.

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 seizures were less which can be explained by the fact that maturity and myelination of brain progressively increases.

In the present study family history of convulsions was present in 09 children (18%) of which 5 had family history of febrile convulsions and 4 had family history of epilepsy.

The risk of child developing epilepsy at a later age is more with a family history of afebrile convulsions.

Studies by Nelson K.B. & Ellenberg J.H. [7] 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.

Other studies by Hauser W.A & Kurland E.T & Tsuboi [8].

have shown a positive family history of seizures, febrile or afebrile in about 10-40% cases of febrile seizure. The high frequency of affection of siblings and parents suggest the hereditary nature of the disease.

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.

In this study of the 50 cases, 46 cases did not yield any growth on blood culture. Of the 04 cases with bacteremia, only 03 cases had significant bacteremia which had 02 *Streptococcus pneumonia* as the infecting organism and 01 *H. Influenza*. The other 01 case grows Coagulase negative *Staphylococcus Aureus* as the organism which was a Contaminant.

The child with significant bacteremia with *Streptococcus Pnumonia* as the infecting organism also had Leucocytosis 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 *et al.* 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.

In the Nigerian study, Malaria was a significant cause of febrile convulsion, but it was not isolated in any case in the present study as Malaria is not endemic in this part of Karnataka.

Mc Intyre P. Kennedy. R. & Harris. F.U.K. 1980-82 (2919 blood samples) 9	2.3% occult bacteremia 28% enterobacteriaceae 26% <i>Step. pneumonia</i> 20% <i>Stap. aureus</i>
Sammir S Shah, ELizabeth R Alperm Arch Pediatr adolsec med 2002.10	2.1% bacteremia 85.7% <i>Strep. pneumonia</i>
Present study	92% no growth 4% <i>Strep. pneumonia</i> 2% <i>H. influenza</i> 2% coagulase negative <i>Staph. aureus</i> (contaminated)

**Conclusion**

Even though viruses form major etiological agents for

febrile convulsions, occult bacteraemia should be ruled out in all children presenting with febrile convulsions. Children

with a positive family history of afebrile convulsion should be followed up and evaluated closely as they can develop epilepsy at a later date.

Since the children in the study group (50) 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.

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