

## Original Research Article

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# A study of febrile convulsions with a bacteremia incidence in a tertiary care teaching hospital in Andhra Pradesh

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## ABSTRACT

**Background:** A febrile convolution is linked with high temperature but without significant underlying health issues. These occur most often in children aged six months to five years. Most of the convulsions last less than five minutes, and within an hour of the occurrence, the child is entirely back to normal.

**Methods:** Sixty children aged 3 months to 5 years admitted to the emergency pediatric ward with a history of convolution fever with convulsions, in Narayana Medical College and Hospital were taken up for the study with clinical history, clinical examination, laboratory Investigations.

**Results:** Among 60 children in the study group, 15 (25%) of them were aged between 3 months to 12 months, 21 (35%) of them were between 13 months to 24 months. Gender 36 (60%) are male children. 24 (40%) are female children. Family history of convulsions was positive in 18 (30%) of the 60 (100%) cases, and 7 had family history of epilepsy. 42 (70%) are negative. Most of the cases (85%) showed no growth in blood culture.

**Conclusions:** Blood culture should be performed in all children by febrile convulsions, especially those under the stage of two years. Streptococcus pneumonia was the organism isolated from respiratory tract infection in a child with febrile convolution with significant bacteremia. The symptoms that present can be as harmless as rhinorrhea or cough. Children with a positive family history of afebrile convolution should be closely monitored and test, as they can develop epilepsy later.

**Keywords:** Bacteremia, Convulsions, Epilepsy, Febrile convulsions, Incidence, Seizures

## INTRODUCTION

A febrile convolution is linked with high temperature but without significant underlying health issues. These occur most often in children aged six months to five years. Most of the convulsions last less than five minutes, and within an hour of the occurrence, the child is entirely back to normal.<sup>1</sup>

Between two to five percent of children in Europe & the United States experience at least one Febrile convulsions before the age of five years, To be more popular among boys.<sup>2</sup> Indian studies recommended that up to ten percent of children experience a febrile convolution. Recent data

show that the incidence rate in India is near that in western countries.<sup>3</sup>

Two types of febrile convulsions are simple and complex. A simple Febrile Convulsion is a general convolution (without focal characteristics) that lasts less than 15 minutes and occurs only once in a neurologically stable child over twenty-four hours of fever.<sup>4</sup> Febrile convulsions manifest in the first hours of acute infectious illness; 80% of the febrile convulsions occur during the first day of fever before the parent is aware of the fever.<sup>5</sup>

A complex febrile convolution is described as a febrile convolution that has the following characteristics. Focal

onset or focal features during a convulsion or accompanied by neurological dysfunction or extended time (>15 min), occurring within 24 hours or within the same febrile episode. The child has a prior neurological disability. Different studies showed that the incidence of Complex Febrile Convulsions ranges from nine to thirty-five present.<sup>6</sup>

Febrile convulsions appear to occur in families & both parents may transmit this genetic susceptibility. Family history for febrile convulsions can be elicited in 25 to 40% of children with febrile convulsions and the reported frequency ranges from 9 to 22% in their siblings.<sup>7</sup> Studies show a higher concordance rate in Monozygote than in Dizygote twins. Recently, studies of linkage in several large families in Japan have mapped the susceptibility genes of the febrile convulsions to two putative foci. FEB1 and 2 (chromosome 8q13-q21 and FEB2 chromosome 19p13.3) shows a decreased penetration autosomal dominant pattern.<sup>8</sup> It has been documented that children with febrile convulsion also have iron deficiency anemia.<sup>9</sup>

Febrile convulsions present in children with predisposing factors only when a febrile illness occurs during the critical age period. It has been stated that the convulsions depend on the essence of the infection of the microorganism combined with fever, age, and genetic predisposition. Western European and US epidemiological reports indicate that febrile convulsions are associated with upper respiratory tract infections and other infectious diseases.<sup>10</sup>

Viruses are the most common cause of illness in children with first febrile convolution admitted to the hospital. Among the most commonly associated diseases are Otitis Media, upper respiratory tract infections; Gastro-Intestinal Infections, and Roseola Infantum. Measles is less frequently associated with febrile convulsions.<sup>11</sup>

## METHODS

Total 60 Children aged 3 months to 5 years admitted to the emergency pediatric ward with a history of convulsion fever, in Narayana Medical College and Hospital, Nellore from November 2013 to September 2015 were taken up for the study.

Neurologically normal children in the age group of 3 months to 5 years presenting to the hospital with febrile convulsions are included from the study. Excluded from the study are the afebrile history of convulsions, those who received antibiotics until they were admitted to hospital, history of neonatal convulsions, and static/progressive neurological disorder.

Clinical history: Patients Name, age, gender, history of fever, history of precipitating factors (like upper & lower respiratory tract infections, urinary tract infections). Duration, type and frequency of convulsion, family

history of febrile convulsion, epilepsy, birth asphyxia/developmental delay. A detailed general & systemic clinical examination was done in all cases to find out the foci of infection.

Necessary investigations were carried out through obtaining informed consent from the parents of the patient. Peripheral blood smears. Blood culture and sensitivity, urine routine and microscopy culture & sensitivity, stool routine and microscopy culture and sensitivity (if required). CSF analysis in children less than 18 months of age and undue or unexplained drowsiness or irritability.

Statistical analysis: No statistical method was applicable for the present study as there was no control group in the study. Hence results are expressed in percentage.

## RESULTS

Table 1 shows among 60 children in the study group, 15 (25%) of them were aged between 3 months to 12 months, 21 (35%) 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., 36 children (65%). 11 (18%) are between 25 to 36 months, 6 (10%) are between 37–48 months, 7 (12%) are between 49 to 60 months.

**Table 1: Frequency and percentage of cases with age distribution (n=60).**

Age in months	Frequency (f)	Percentage (%)
3–12	15	25
13–24	21	35
25–36	11	18
37–48	6	10
49–60	7	12

**Table 2: Frequency and percentage of cases with gender distribution.**

Gender	Frequency (f)	Percentage (%)
Male	36	60
Female	24	40

Table 2 shows gender 36 (60%) are male children. Most of the children in the study group were male children. 24 (40%) are female children.

**Table 3: Frequency and percentage of cases with religion wise distribution.**

Religion	Frequency (f)	Percentage (%)
Hindu	29	48
Muslim	26	43
Christian	5	8

Table 3 shows religion 29 (48%) are Hindu, most of the children in the study group were Hindu children, 26

(43%) are Muslim children, 5 (8%) are Christian children.

**Table 4: Frequency and percentage of cases with symptoms.**

Symptoms	Frequency (f)	Percentage (%)
<b>Rhinorrhoea</b>	35	58
<b>Cough</b>	19	32
<b>Loose stools</b>	12	20
<b>Vomiting</b>	2	3
<b>Rashes</b>	1	2

Table 4 shows among the study group, we have noticed rhinorrhea in 35 children (58%), cough in 19 children (32%), loose stools in 12 children (20%), vomiting in 2 (3%) and rashes in 1 child (2%).

**Table 5: Frequency and percentage of cases with duration of convulsions.**

Duration of convulsions	Frequency (f)	Percentage (%)
<b>Less than 15 mins</b>	52	87
<b>More than 15 mins</b>	8	13

Table 5 shows in the study group of 60 children, 52 (87%) cases had typical febrile convulsions, which lasted for less than 15 minutes, and 8 (13%) cases had atypical

febrile convulsions which lasted for more than 15 minutes.

**Table 6: Frequency and percentage of cases with a family history of convulsions.**

Family history of febrile convulsions	Frequency (f)	Percentage (%)
<b>Positive</b>	18	30
<b>Negative</b>	42	70

**Table 7: Frequency and percentage of cases with organisms isolated in blood culture.**

Blood culture	Frequency (f)	Percentage (%)
<b>No growth</b>	51	85
<i>Streptococcus pneumonia</i>	2	3
<b>Coagulase-negative</b>	7	12
<i>Staphylococcus</i>		

Table 6 shows the family history of convulsions was positive in 18 (30%) of the 60 (100%) cases, of which 11 had a history of febrile convulsions and 7 had a history of epilepsy. 42 (70%) are negative.

Table 7 shows out of the 60 cases studied; blood culture yielded growth in 9 (15%) cases. Most of the cases (85%) showed no growth in blood culture. Two growth was *Streptococcus pneumoniae*, and the rest were Coagulase-negative *Staphylococcus aureus* (contaminant).

**Table 8: Characteristics of the child who had significant bacteremia.**

Age / Sex	Symptom	Total count	Differential count	Organism in blood culture	CSF	Blood CRP
<b>1 year /Female</b>	Fever, cough, cold	28,000 cells/cmm	N <sub>77</sub> ,L <sub>22</sub> ,E <sub>01</sub>	<i>Streptococcus pneumoniae</i>	Normal	Positive
<b>1 year /Female</b>	Fever, cough, cold	27,500 cells/cmm	N <sub>76</sub> ,L <sub>20</sub> ,E <sub>01</sub>	<i>Streptococcus pneumoniae</i>	Normal	Positive

Table 8 shows the characteristics of the child who had significant bacteremia. Both are one-year female children having fever, cough, cold, organism in blood culture was *Streptococcus pneumoniae*, CSF normal, and blood CRP positive.

## DISCUSSION

In the present study, most of the children's age group is 13-24 months. There is also more occurrence of infection in this age group due to immature immunological activity. As the age increases, there has been less incidence of febrile convulsions, which can be explained by the fact that maturity and myelination of the brain increase progressively. Febrile convulsions were noticed in 34 males (60 %) and 24 females (40%); the ratio being 3:2.

The present study supported by Alexander KC Leung, studied on febrile convulsions, with the highest incidence amongst the ages of 12 and 18 months, is probably caused by the weakness of the developing CNS to fever, combined with underlying genetic disposition & ecological factors. Most febrile convulsions happen within 24 hours of the onset of fever; febrile convulsions can be either simple or complicated. Approximately 30 to 40 percent of children with febrile seizures can recur during early infancy. While febrile convulsions are seen in all ethnic groups, the Asian population (5 to 10 percent of Indian children and 6 to 9 percent of Japanese children) is more frequently seen. In Guamese, the incidence is 14 percent. The ratio of male and female is around 1.6 to 1.<sup>5</sup>

In the present study, the incidence in Hindus and Muslims was approximately equal, which could be attributed to the fact, most of the patients visiting the

hospital are alike from both groups. Among the symptoms, Rhinorrhea, cough, and diarrhea were significant. Vomiting two and rash occurred in 1 case. The majority of symptoms were of the upper respiratory tract.

Daoud studied on iron, a possible risk factor for the first febrile convolution, and anemia was noticed in 31 children out of 57 (57.40%). Suggested potential role of iron deficiency in the occurrence of febrile convulsions.<sup>9</sup>

Of the 60 cases, 51 cases did not yield any growth in blood culture. Of the 9 cases with bacteremia, only 2 cases had significant bacteremia, which had *Streptococcus Pneumonia* as the infecting organism. The other 7 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 leucocytosis with neutrophilia, toxic granules in neutrophils.

The child with significant bacteria was at the age of less than 2 years. Studies by Mc Intyre have also shown most of the children with bacteremia were in less than two years.<sup>12</sup>

Although most febrile convulsions are caused by a viral infection, occult bacteremia forms a small but significant percentage in children with febrile convulsions, particularly those aged under two years.

There was a history of convulsions in 18 children in the present study, 11 of whom had a family history of febrile convulsions, and 5 had a family history of epilepsy. A child at a later age is more at risk of developing epilepsy with a family history of afebrile convulsions.

Sajun Chung studied on febrile convulsions and noted history also has a role in causal whether children have febrile convulsions reappearances and later develop afebrile convulsions. 25% to 40% of patients showed a positive history for febrile convulsions.<sup>13</sup>

## CONCLUSION

Blood culture should be performed in all children by febrile convulsions, especially those under the stage of two years. *Streptococcus pneumonia* was the organism isolated from respiratory tract infection in a child with febrile convolution with significant bacteremia. The symptoms that present can be as harmless as rhinorrhea or cough. Children with a positive family history of afebrile convolution should be closely monitored and test, as they can develop epilepsy later. None of them in the study group had refractory convulsions.

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**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee

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