

Clinico - Etiological Correlation of Simple Febrile Seizures in Children

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Abstract

Background: To evaluate the risk factors and their correlation with simple febrile seizures in the children. **Methods:** A total of 30 patients aged < 5 years and > 3 months presenting with the clinical diagnosis of simple febrile seizures which were generalized in nature, and Lasting less than 15 minutes with only one episode during the illness included in this study. **Results:** In the present study, patients were included in the age group of 3 months and 5 years. Mean age was 26.66 ±12.46 months. At the time of the simple febrile seizure, 3 patients (10%) had a temperature of 101°F, 6 (20%) had 102°F, 12 (40%) patients had 103°F comprising the commonest group and 8 patients (27.7%) had a temperature of 104°F. Only one patient (3.3%) had a temperature of > 105°F, comprising the rarest group. Mean temperature was 102.93 + 12.46 °F. Information about the intensity of fever at the time of seizure was provided by mother or other family members in 60 percent cases and noted within the institute in 40 per cent cases. Nineteen patients (63.3%) had seizure lasting < 5 minutes. Mean duration of seizure was 5.86 + 3.62 minutes. Prevalence of abnormal EEG increased with increasing number of previous febrile seizures. Abnormal EEG was obtained in 66.7% cases with four previous episodes of febrile seizures. **Conclusion:** It can be concluded that simple febrile seizures are most common in age groups of 13-24 months with slight male predominance. Family history of febrile and non-febrile seizures and perinatal abnormalities are other predisposing factors for simple febrile seizures. Upper respiratory catarrh is the commonest cause of fever. Abnormal EEG is more common with increasing age, in patients with family history of febrile seizures and in those delivered by caesarean section.

Keywords: Febrile Seizure, Children, EEG, Perinatal, Fever.

INTRODUCTION

Seizures are a common neurologic disorder in the pediatric age group. It is defined as a paroxysmal involuntary disturbance in brain function that may manifest as an impairment or loss of consciousness, abnormal motor activity, behavioural abnormalities, sensory disturbances. or autonomic dysfunction. In pediatric age group, it

occurs with a frequency of 4-6 cases/1,000 children.^[1] Febrile seizures are one of the commonest pediatric neurological problems.^[2] They are defined 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. Seizures with fever in children who have suffered a previous non-febrile

seizure are excluded.^[3] Febrile seizures occur in 3-4 per cent of children. The risk of recurrence rate is only 25-30 per cent. Most recurrences (75%) occur within one year of the first febrile seizure.^[4] Nonfebrile seizures following febrile convulsions occur in 2-5 percent of cases.^[5-8] They occur with an increased frequency in patients with developmental abnormalities antedating the first febrile convulsion, with a first-degree relative with epilepsy, and with complex febrile convulsions.^[9-11]

The mental and neurological development of patients with febrile convulsions remains normal in most patients who had developed normally prior to their febrile convulsions.^[12] The incidence of mental retardation was found to be 22 percent by Lennox, 13.4 percent by Aicacdi and Chevrie and 8 percent by Wallace and cun.^[13-15] Febrile seizures are often categorized into two subgroups: simple and complex. A simple febrile seizure is characterized by duration less than 15 minutes, generalized in nature, only one episode in one illness and never followed by transient neurological deficit. Pre-existing neurological abnormality and family history of febrile or non-febrile seizures may/may not be present.^[16] It constitutes about 85 percent of febrile seizures.^[4] Fever responsible for the occurrence of simple febrile convulsions are more often caused by upper respiratory infections, otitis media, pneumonia, influenza-like diseases, gastroenteritis, and urinary tract infections.^[12]

Various risk factors have been identified for simple febrile seizures. They are strongly age-dependent.^[12] The median age of occurrence is 18-22 months.^[17] They are slightly more common in males, the sex ratio varying between 1.4: 1 and 1.2: 1.^[18-19] They occur with increased frequency among family members of patients with febrile convulsions.^[20-25] It has been reported that the febrile seizures are most common within 24 hours of onset of fever.^[26]

Controversy continues to exist with regard to the precise definition, diagnostic evaluation and especially the treatment.^[4] The value of electroencephalography (EEG) in the management of the child with simple febrile seizure is doubtful. There is usually marked generalized slowing after the seizure, which may persist upto a week or more and may be asymmetrical.^[17] Abnormalities seen after the postictal period include spikes, 4-6/second slow waves, or spike waves. However, these abnormalities are neither predictive of subsequent epilepsy nor of recurrence.^[27-29] In view of the fact that simple febrile seizures is a fairly common problem, routine use of unwarranted anticonvulsant therapy with its associated drug induced complications is a matter of great concern for parents and educationists, who have voiced concern over increasing duration of school absenteeism for a fairly benign disorder. In the present study, an attempt was made to evaluate the risk factors and their relation with simple



febrile seizures, keeping in view the high incidence of febrile seizures in the children and scanty literature available in our country.

MATERIALS AND METHODS

A total of 30 patients presenting with the clinical diagnosis of simple febrile seizures in the Accident and Emergency Department and the Department of Pediatrics of Pt. B.D. Sharma, Postgraduate Institute of Medical Sciences, Rohtak were the case material. The patients who were clinically diagnosed as cases of simple febrile seizures with the following features were subjected to study: (i) Seizures generalized in nature (ii) Lasting less than 15 minutes (iii) Only one episode during the illness (iv) Age < 5 years and > 3 months.

The following patients were excluded from the study: (1) Age > 5 years and < 3 months (2) History of non-febrile seizures (3) Patients with intracranial infections (4) Patients with neurological abnormality. The patients were followed up till the fever subsided and also two weeks after the seizure. The data so obtained was analysed statistically.

Electroencephalography: EEG was carried out in all the patients subjected to study after a period of two weeks after the seizure. Recordings were done on a 16-channel EEG machine, Medicare Polygraph. Electrode placement was according to International IO-20 system. Both the unipolar average reference and bipolar

derivations were used in routine recordings.

Computerized Tomography All study patients were subjected to plain CT scan (head) followed contrast scan on whole body CT scanner-SCIDMADZU SCT-3000 TF (512x512). Contrast study was done by using contrast media containing meglumine Iothalamate of strength 60 per cent (available as injection Conray 280) intravenously. The brain scans were performed with the plane of sections of the slices 10°-20° to the Reid's Baseline. The scans were photographed and kept for record.

RESULTS

Six patients (20%) were in the age group of 3-12 months, 11 (36.7%) in 13-24 months age group constituting the commonest group, 8 (26.7%) in 25-36 months, 3 (10%) in 37-48 months and 2 patients (6.6%) were in the age group of 49-60 months constituting the rarest group. Mean age of children was 26.66±12.46 months. Out of a total of 30 patients, 17 (56.7%) were males and 13 (43.3%) were females. Male to female ratio was 1.3.

Family history of seizures was present in 5 patients (16.7%), out of which febrile seizures were present in 3 patients (10%) and non-febrile seizures in 2 patients (6.7%). Parents had history of seizures in 2 cases and other siblings in 3 cases. Four patients (13.3%) had perinatal abnormalities. One patient (3.3%) had been delivered as breech

and three patients (10%) by caesarean section.

At the time of the simple febrile seizure, 3 patients (10%) had a temperature of 101°F, 6 (20%) had 102°F, 12 (40%) patients had 103°F comprising the commonest group and 8 patients (27.7%) had a temperature of 104°F. Only one patient (3.3%) had a temperature of > 105°F, comprising the rarest group. Mean temperature was 102.93 + 12.46°F. Information about the intensity of fever at the time of seizure was provided by mother or other family members in 60 per cent cases and noted within the institute in 40 per cent cases.

Nineteen patients (63.3%) had seizure lasting < 5 minutes, 9 patients (30%) had duration of 6-10 minutes and in 2 patients (6.7%) seizure lasted for 11-14 minutes. Mean duration of seizure was 5.86 + 3.62 minutes.

The information about the duration of seizure was provided by the mother or other family members in 75 per cent cases and seizure was observed in the institute in 25 per cent cases.

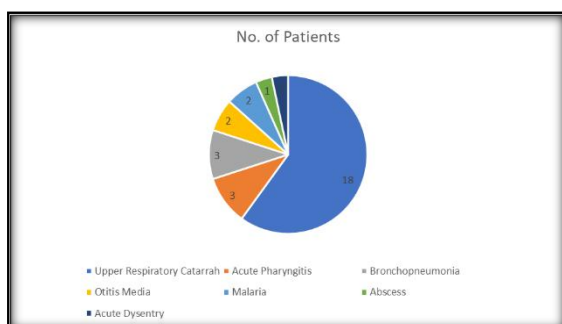


Figure 1: Distribution of Cases of simple Febrile Seizures According to Cause of Fever (N=30)

Out of a total of 30 patients, 18 (60%) had upper respiratory catarrh, accounting for the commonest group. Three patients (10%) had acute pharyngitis, 3 (10%) bronchopneumonia, 2 (6.7%) otitis media and 2 (6.7%) had malaria. Abscess and acute dysentery were seen in one patient each (3.3%).

Throat swab was sterile in all the cases with upper respiratory catarrh, acute pharyngitis and otitis media. None of the patients had received any antibiotic prior to taking the swab.

Table 1: Correlation of Age with Intensity of Fever

Age Group Months	No. Of Patients	Temperature (°F)				
		101	102	103	104	≥105
3-12	6	-	2	2	1	1
13-24	11	2	3	4	3	-
25-36	8	1	-	2	4	-
37-48	3	-	1	2	-	-
49-60	2	-	-	2	-	-
Total	30	3	6	12	8	1

All the patients in the age group of 3-12 and 37- 48 months had temperature more than 101°F at the time of seizure. The most common temperature observed in all the age groups was 103°F except 25-36 months age group, where 104°F was most common.

Table 2: Correlation of Cause of Fever with Duration of Seizure

Cause of Fever	No. of Patients	Duration of seizure Minutes		
		1-	6-	11

		5	1	-
		0	14	
Upper Respiratory Catarrh	18	1	5	1
Acute Pharyngitis	3	2	1	-
Bronchopneumonia	3	2	1	-
Otitis Media	2	2	-	-
Malaria	2	2	1	1
Abscess	1	1	-	-
Acute dysentery	1	-	1	-
Total	30	19	9	2

Majority of the patients (63.6%) had seizure lasting for 1-5 minutes in all the groups. In 66.67% cases with upper respiratory catarrh, duration of seizures was of 1-5 minutes.

Table 3: Correlation of Cause of Fever with Age

Cause of Fever	No. Of Patients	Age Group Months				
		3-5	1-3	2-5	3-7	4-9
Upper Respiratory Catarrh	18	4	8	2	2	2
Acute Pharyngitis	3	-	-	3	-	-
Bronchopneumonia	3	1	1	1	-	-
Otitis Media	2	-	-	1	1	-
Malaria	2	-	1	1	-	-

Table 5: Correlation of Duration of Seizure with Perinatal Abnormalities and Family History Of Seizure

Duration of seizure Minutes	No. Of Patients	Perinatal Abnormality Breech Delivery	Caesarean Delivery	Family History Of Seizures Febrile	Non Febrile
1-5	6	1	3	2	-
6-10	11	-	-	-	2

Abscess	1	1	-	-	-	-
Acute Dysentery	1	-	1	-	-	-
Total	30	6	11	8	3	2

Maximum number of patients (44.4%) with upper respiratory catarrh were in the age group of 13- 24 months and all the patients with acute pharyngitis in age group 25-36 months. All the cases (6.6%) in age group 49-60 months had upper respiratory catarrh. Acute pharyngitis (33.3%), bronchopneumonia (50%) and otitis media (33.3%). [Table 3]

Table 4: Correlation of Age with The Duration of Seizures

Cause of Fever	No. of Patients	Duration of seizure Minutes		
		1-5	6-10	11-14
3-12	6	4	2	-
13-24	11	8	2	1
25-36	8	4	4	-
37-48	3	1	1	1
49-60	2	2	-	-
Total	30	19	9	2

Majority of the patients in all the age groups (63.3%) had duration of seizure 1-5 minutes. Only patients in the age group 13-24 months and 37-48 months had seizure lasting for 11-14 minutes. [Table 4]



11-15	8	-	-	1	-
Total	30	1	3	3	2

Perinatal abnormality was seen only in patients who had duration of seizure 1-5 minutes, out of which 15.7% had been delivered by caesarean section and 5.2% as breech. Family history of febrile seizures was seen in 11.1% patients who had seizure lasting for 1-5 minutes, and 50% with duration of seizure 11-14 minutes. 22% cases with seizures lasting for 6-10 minutes had familial prevalence of non-febrile seizures.

Normal EEG graph was observed in 18 patients (60%) and abnormal graph in 12 patients (40%). Out of a total of 5 patients with a family history of seizures, 2 had abnormal EEG. All the patients (40%) with a family history of non-febrile seizures had an abnormal graph. However, 92.3% cases with no past history of febrile seizures had a normal EEG graph. Prevalence of abnormal EEG increased with increasing number previous febrile seizures. Abnormal EEG was obtained in 66.7% cases with four previous episodes of febrile seizures.

DISCUSSION

In the present study, patients were included in the age group of 3 months and 5 years. Youngest patient was 6 month who had presented with the first episode and the oldest patient was 54 months of age so age who had three episodes in the past. Mean age was 26.66 ±12.46 months. Maximum patients were in the age group of 13-24 months (36.7%) followed by the age

group 25-36 months (26.7%). Minimum patients were in the age groups 49-60 months (6.6%) and 37-48 months (100%) The present study is consistent with other studies. Wallace (1975) reported that the simple febrile seizures were more common at an age of >16 months, accounting for 37 patients (74%) out of a total of 50.^[30] Wadhwa et al (1992) studied that the maximum age of onset of simple febrile seizures was before 3 years in 75 per cent of cases.^[31] which is comparable with present study where 83.4% percent patients were below 36 months of age. Febrile convulsions are less common before 6 months of age as convulsions before this age are more common with CNS infectious etiology.^[12]

In the present study, male to female ratio was 1.3. Out of a total of 30 patients, 17 (56.7%) were males and 13 (43.3%) were females. In the age group of 3-12 months, male to female ratio was 2.0. It was 1.2, 1.6, 0.5 and 1.0 in the age groups 13-24, 25-36, 37-48 and 49-60 months respectively. In all the subgroups except 37-48 months, males predominated females by about 1.3 times. This study is consistent with the study conducted by Wallace who reported that out of a total of 50 patients of simple febrile seizures, 32 (64%) were males and 18 (36%) were females.^[30] Berg et al studied 347 patients with febrile seizures, females numbered 130 (37.5%) and males 217 (62.5%).^[26] EI-Radhi et al reported that 46 percent patients were females and 54



per cent males out of a total of 171 patients with febrile seizures.^[32]

This study is comparable with other studies. In the National Collaborative Perinatal Project (NCP), Nelson and Ellenberg reported that out of a total of 1,706 patients, the family history of febrile seizures was present in 7.3 per cent and that of non-febrile seizures in 5.6 percent patients.^[7] Verity et al,^[33] and Berg et al,^[26] concluded that family history of febrile seizures was present in 16 per cent and 24 percent cases respectively and that of non-febrile seizures in 9.7 per cent and 4 percent cases respectively. Wadhwa et al reported that the familial prevalence of febrile seizures was 20 per cent and that of afebrile seizures was 6-7 percent in the simple febrile seizures.^[31]

In present study, 73.3 percent of patients had a seizure within 24 hours of onset of fever and 26.7 percent after 24 hours. It is comparable with other studies. Anderson et al reported that out of a total of 100 patients with simple febrile seizures, 9 percent had temperature for more than 24 hours prior to the seizure and 91 percent had fever for less than 24 hours.^[34] Berg et al studied 342 children, 195 (57%) had seizure within one hour and 267 (78%) within 24 hours of onset of fever, 72 (21.3 %)(1.7%) had after 24 hours of onset of fever. ^[26]

In present study conducted on 30 patients, at the time of the seizure, 10 percent patients had a temperature of 101° (38.3°C), 20 per cent 102°F (38.9°C), 40 per cent 103°F (39.5°C), 27.7

per cent 104°F (40.1 °C) and 3.3 percent had a temperature of >105°F (40.7°C). 70 percent of patients had temperature in the range of 101°F-103°F and 30 per cent patients had temperature > 104°F. Mean temperature was 102.93°F (39.4°C). In the present study, in 60 per cent of cases temperature at the time of seizure had been recorded by mothers or other family members and in 40 per cent cases temperature was noted in the institute at the time of the seizure. In present study, out of a total of 30 patients, 70 per cent had upper respiratory catarrh and 10 per cent had acute pharyngitis at the time of the seizure. 10 percent had bronchopneumonia, 6.7 percent otitis media, 6.7 percent malaria and acute dysentery and abscess were seen in 3.3 per cent cases each. The results of the present study are consistent with the other studies. Results of our study were in agreement with the results of studies done by Chapparwal et al.^[35] and Ramakrishna et al,^[2] as they reported 68 % and 71 % URTI as a cause of fever respectively. In the present study, throat swab for culture and sensitivity was taken in all the patients with upper respiratory tract infection prior to giving them any antibiotic. It was sterile in all the cases. Two patients with otitis media have been reported in the study, out of which one patient had only acute otitis media (right side) and one had otitis media associated with symptoms of upper respiratory catarrh.

In the present study, EEG was done two weeks after a simple febrile seizure in all the 30 cases. A normal graph was

obtained in 60 per cent and abnormal EEG graph seen in 40 per cent cases. In other studies the prevalence of abnormal EEG was 6 per cent which was comparatively low. The present finding is consistent with the findings observed by oi Thom, Kajitani et al and Subacbiba Jla et al who reported that paroxysmal discharge were common with increasing age and were especially frequent in children aged >3 years (36 months).^[36-41] Aicardi et al,^[42] and Sofijanov et,^[29] concluded that EEG abnormalities become increasingly common with increasing age especially after 2 years of age (24 months). In our series the abnormal EEG was seen with increase in age of the patients. Out of two cases who had seizure for 11-14 minutes duration, all had an abnormal EEG graph while 2 cases (22.3%) out of a total of 9 patients who had duration of seizure 6- 10 minutes had an abnormal EEG. Out of 19 Patients with seizure lasting for 1-5 minutes, an abnormal EEG was obtained. Abnormal EEG was reported to be more common with increasing age. Approx. 66.67% per cent patients with a family history of febrile seizures had an abnormal EEG and all patients with family history of non-febrile seizures had abnormal EEG. In the present study conducted on 30 patients, all the patients delivered by caesarean section (10%) had abnormal EEG and the patient delivered as breech (3.3%) had a normal EEG graph. This finding has not been correlated by other workers. In the present study, out of total of 30 patients, 13 patients had no story of febrile seizures. Twelve (92.3%) had a normal graph.

CONCLUSION

It can be concluded that simple febrile seizures are most common in age groups of 13-24 months with slight male predominance. Family history of febrile and non febrile seizures and perinatal abnormalities are other predisposing factors for simple febrile seizures. Upper respiratory catarrah is the commonest cause of fever. Abnormal EEG is more common with increasing age, in patients with family history of febrile seizures and in those delivered by caesarean section.

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