



Clinical, Epidemiological and Laboratory Characteristics of Patients with Febrile Convulsion

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ABSTRACT

Background: Febrile convulsion (FC) is the most common type of seizure that occurs in children aged 6-60 months. It occurs in two forms including simple and complex febrile seizure.

Objectives: The purpose of this study was to determine the clinical, epidemiologic and laboratory features of patients admitted to Ali-ebne-Abitaleb hospital of Zahedan with febrile seizure in 2010-2011.

Patients and Methods: In this cross-sectional study, the patients with diagnosis of febrile seizure were the target population. We obtained patient's data based on clinical examination, history and information registered in hospital medical files including demographic, clinical and laboratory findings.

Results: During the study period, 160 children with febrile seizures and mean age of 26.2 ± 19.5 months were studied. Male to female ratio was 1.2:1. Ninety-nine (61.9%) children had simple seizures and 61 (38.1%) children had complex seizures. Thirty-one (19.4%) of the patients had family history of febrile seizures and family history of epilepsy was positive in 6.3% of cases. Ninety one percent of cases were born with normal vaginal delivery. Also, only 5 patients (3.1%) had less than 37 weeks of gestational age at birth. The mean rectal temperature of the patients was $38.5 \pm 0.67^\circ\text{C}$. Gastroenteritis was the most common cause of fever in our patients.

Conclusions: The highest frequency of FC was seen in younger than 20-month-old children. Except for the lower incidence of positive history of prematurity and higher prevalence of gastroenteritis, results of the present study are relatively similar to other studies.

Keywords: Seizures; Febrile; Children; Clinical; Epidemiological

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► Implication for health policy/practice/research/medical education:

Febrile convulsion is the most common type of seizure in children. Knowledge about the epidemiology and clinical features of various diseases including febrile seizure is a necessity for physicians in each country or region. This study will help increase the knowledge of general practitioners and pediatricians in this regard.

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1. Background

Febrile convulsion (FC) is one of the most common types of seizures in childhood from which 2-5 percent of children suffer and usually occurs between 3 months and 5 years old. According to the definition of International Epilepsy Association, febrile convulsion occurs in infants older than 1 month together with febrile illness, without any evidence of the central nervous system infection, without history of neonatal seizures or a previous unprovoked convulsion and does not meet the features of other symptomatic convulsions. It is divided into two types: simple and complex. Simple convulsion usually takes less than 10-15 minutes, generalized tonic-clonic, tonic, clonic or atonic. Complex FC has one or more of the following features: a focal onset or showing focal deficit during convulsion attack, a duration longer than 15 minutes, during the first 24 hours, it occurs more than once. Despite its benign nature, the febrile convulsion is one of the most common reasons for admission to pediatric emergency wards worldwide. In these patients, in most cases, fever is the result of upper respiratory system, gastroenteritis and urinary tract infection (1-3). The incidence of FC varies in different places of the world, ranging from 5-10 % in India, 8.8% in Japan and 14% in Guam (3). This illness was distinguished from other types of convulsions in the mid-nineteenth century (4). Recurrence is very common in this illness, but neural evolution does not change in patients. Numerous conducted studies have noted hazardous factors for its recurrence for infants less than 15 months old, including fever background, convulsion history in first degree relatives, complex convulsion and looking after in daily care units (5). The study by Kong revealed that the convulsion history in first degree relatives was the only substantial risk of convulsion recurrence (6).

2. Objectives

With respect to the issue that FC is the most common seizure type in children, the objective of this study was to assess the clinical, epidemiological and laboratory characteristics of FC in children and its comparison with similar studies in other parts of the world.

3. Patients and Methods

In this cross sectional study, 160 children aged between 6-72 months presenting with FC who were admitted to the pediatric emergency ward of Ali-ebne-Abitaleb hospital between June 2010 and June 2011 were evaluated. Data were collected regarding age, gender, type of convulsion (generalized or focal), duration of convulsion, type of the febrile convulsion (simple or complex), rectal temperature, family history of convulsion, familial background of epilepsy, past history of the febrile convulsion,

underlying causes of fever, existence or nonexistence of meningitis signs and symptoms, gestational age at birth, clinical and laboratory data. Patients with a past history of unprovoked convulsion, metabolic disorders, known illnesses of central nervous system and neurological deficits were excluded from this study. Abnormal cerebrospinal fluid analysis included one or more of the following features: positive gram stain, more than 5 white blood cells, and low glucose content of cerebrospinal fluid or increased CSF protein. Anemia is defined as hemoglobin levels less than 11 g/dl for age group 6-72 months. A written informed parental consent was obtained for each patient in this study. Data was analyzed by SPSS version 16. This study was approved by the ethics committee of Zahedan University of Medical Sciences.

4. Results

The mean age of patients was 26.2 ± 19.5 months. Eighty seven patients (54.4%) were boys and 73 patients (45.6%) were girls. The highest frequency of FC was seen in the six to 20-month age group, which included 86 children (53.9%). In contrast, the lowest frequency belonged to the age group of 34-48 months, which contained only 10 children (6.3 %). There was a history of prematurity in 5 children (3.1%). A family history of FC and epilepsy was found in 31 cases (19.4 %) and 10 cases (6.3 %), respectively. One hundred forty four (90%) children were presented with generalized convulsions and 16 (10%) had focal convulsion. Type of FC was simple in 99 (61.9%) and complex in 61 cases (38.1%). The majority of patients (78%) had seizure durations less than or equal to 15 minutes. The mean rectal temperature during convulsion attack was 38.3°C ranging from 38 to 40°C . According to history and physical examination, it was determined that for 70 patients (43.7%) indications for lumbar puncture were put. Lumbar puncture was performed for sixty patients and for ten patients; it was not approved by their parents. Among them who were put under lumbar puncture, eight patients had abnormal findings in cerebrospinal fluid analysis in favor of meningitis. For each patient, an average of 4.6 laboratory diagnostic tests was performed.

Cerebral imaging was conducted on 30 patients (18.7 %), however, these tests did not show any abnormality in any of the cases. Among all the patients, convulsion of 54 individuals (37.5%) was controlled with therapeutic measures. Proportion of patients with febrile seizures to all hospitalized patients for seizure disorders was 30%. Sixty-two (38.7%) patients were visited by a physician for current illnesses before seizure attack. Ninety-four patients (58.5%) had a background of antibiotic consumption during the current illness. *Table 1* shows the abnormal laboratory findings in patients with FC. Gastroenteritis was the most common cause of febrile illness in our study (*Table 2*).

Table 1. Frequency of Abnormal Laboratory Findings in Patients With FC

Lab Abnormality	Cases, n = 160, No. (%)
Leukocytosis	38 (23.8)
Leukopenia	6 (3.7)
Thrombocytosis	20 (12.5)
Thrombocytopenia	11 (6.9)
Anemia	56 (35)
Hypoglycemia	13 (8.1)
Hypernatremia	8 (5)
Hyponatremia	16 (10)

Table 2. Distribution Frequency of Etiology of Fever in Patient With FC

Etiology of Fever	Cases, n = 160, No. (%)
Urinary Tract Infection	26 (16.2)
Gastroenteritis	61 (38.1)
Meningitis	8 (5)
Respiratory Tract Infection	32 (20)
Otitis Media	2 (1.2)
Unclassified	31 (19.5)
Total	160 (100)

5. Discussion

Febrile convulsion is the most common type of seizure during childhood which occurs in 2-5 % of children. It usually occurs in children between 3 months and 5 years. Fortunately, most febrile seizures are benign and rarely cause brain damage (7, 8). Although febrile seizures are benign in nature, when seizures occur, they may lead to fear and anxiety of parents and subsequently it potentially affects the family's quality of life. Physical, psychological and behavioral disorders may manifest due to the lack of sufficient information of parents about febrile seizures. In our study, the majority of children were under 2 years old and our findings were similar to other studies in which FC was in the age range of 6 months to 3 years with peak incidence at the age of 18 months (9). In the present study, prevalence of FC was slightly predominant in males than females and this is in agreement with the results of other studies (7, 8). In our study, 31 patients (19.4%) had a positive family history of FC, while this percentage in the other studies varied from 25% to 40% (10). Ten patients (6.3%) in this study had a positive family history of epilepsy, while this frequency varied from 1.6% to 9% in other studies (11). Ninety percent of children in the present study had generalized convulsion that is similar to the other studies. In our study, 99 children (61.9%) were

suffering from simple FC, while this was between 60 to 90 percent for other studies. In a study conducted by D. Donaldson et al. 55 percent of convulsions were simple and 45 percent complex, which almost corresponds to our study (12). In another study conducted by Fallah R. et al., it was determined that in one third of patients, there was complex FC (13). In a study by Essam J. Al-Zwaini in Iraq, 27% of cases had complex FC (14). In our study, 38.1% of studied individuals (61 patients) had complex FC and this reveals that complex FC was more common in comparison to other mentioned studies (13, 14). In the study by Norah A. Al-Khathlan et al. on 69 children, which was done on children between 7 to 70 months, 59.5% of patients were males (15). In our study, 54.4% were boys and this was relatively consistent with Norah A. Al-Khathlan et al. study. In the study of Essam J. Al-Zwaini, the mean temperature during the first attack was reported to be 39.7 °C (14), while in the present study; one half of patients had rectal temperatures between 38 and 39 °C. In addition, the mean rectal temperature of patients in this study was 38.5 ± 0.67 °C. Compared to the Essam J. Al-Zwaini study, in which the history of prematurity existed in 13 percent of cases, in our study, only 3.1 percent (5 patients) had a history of prematurity, which is less than other studies in this respect (14). In study by Norah A. Al-Khathlan et al. in 4 percent of cases, signs and symptoms of meningitis existed and in 35 percent of cases, no reason was specified for fever (15). Additionally, in a study by Essam J. Al-Zwaini, upper and lower respiratory tract infections were the causes of febrile illness in 67 percent of patients (14) while, in the current study, 38.1 percent of patients had febrile illnesses resulting from gastroenteritis and 20 percent of cases had upper and lower respiratory system infection, 16.2 percent had fever resulting from urinary tract infection and 5 percent of all cases, had fever caused by meningitis and finally, in 19 percent, miscellaneous causes were found. Family history of FC existed in 35 percent of patients studied by Essam J. Al-Zwaini (14), while this was 19.4 percent in our study. In a study conducted by Bidabadi E. et al. (16), 44% of patients with febrile seizure suffered from iron deficiency anemia while 35% of patients in the present study were anemic.

The relationship between iron deficiency anemia and FC has been suggested by several studies, although there are conflicting results regarding the role of iron deficiency anemia in FC (16-20). We found similarities and differences with respect to other studies. Although many findings of our study were similar to other studies, there were differences in the commonest cause of fever and the percentage of patients with positive history of FC. Physicians, medical staff, audio and video media should make more effort in lumbar puncture and its safety in order to heighten the level of awareness and public culture because faster and early diagnosis of meningitis would pre-

vent its serious complications. Early referral of patients with a positive family history of FC is recommended for diagnosis and treatment of the underlying causes. FC is a common benign disorder, and often resolves spontaneously. Therefore, education and reassurance of the parents is the cornerstone of management and follow-up for this disorder.

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