

## FEBRILE CONVULSIONS: THE ROLE PLAYED BY PARACLINICAL EVALUATION

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### **Abstract**

#### **Objective**

This survey evaluates the necessity of biochemical and imaging findings for patients with initial diagnosis of febrile convulsion, and also aims at determining the degree to which results of paraclinical examinations delineate management of patients.

#### **Materials & Methods**

Data of 302 patients referred to Mofid Children Hospital during two years (2005-2006) for febrile convulsions (FC), were collected in formatted questionnaires and analyzed.

#### **Results**

Abnormal lumbar punctures were reported in 9 patients, 3 of which had bacterial meningitis (1%). Biochemical tests including sodium, potassium, calcium, urea and glucose measurement, were performed for 289 (of 302 patients); of these 289, 9 cases were reported with hyponatremia, one case with hypokalemia and one case with hypocalcemia. Brain CT was done in 51 cases and the results were abnormal in 4%, included a patient with status epilepticus.

#### **Conclusion**

Considering the results obtained from data, we suggest that most of the paraclinical examinations are not needed for Febrile Convulsions (FC), for simple FC, in particular.

**Key words:** febrile convulsion, paraclinical evaluation

### **Introduction**

Febrile Convulsion (FC) is common event which mostly occurs between the ages of 6 months and 3 years; however it can occur up to 6 years (1). The incidence is 2-4% in different communities; however, in some communities it has been reported to range between 7-14% (2). Genetics plays an important role in the etiology of FC (3). Convulsion is attributed to fever when the other causes of convulsion, such as metabolic causes or CNS infections, are ruled out. The International League Against Epilepsy (ILAE) define a febrile seizure as "a seizure occurring in childhood after one month of age, associated with a 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 seizures" (4,5). The most important point is the correct diagnosis of the precise illness causing the

seizure, facilitating differentiation between it and the other causes of convulsion. Parents who are frightened and worried about their child's febrile convulsion must be trained to help their child as much as possible; FC has a good prognosis and in the most cases they appear to have no subsequent effects. In general, generalized tonic and clonic convulsions last less than 10-15 minutes and sometimes they cause a little drowsiness in the child. FC are typically divided into two types, "simple" and "complex". A simple FC comprises of generalized tonic-clonic activity without focal features, of less than 10 minutes duration, without a recurrence in the subsequent 24 hours and resolving spontaneously. Complex febrile seizures are defined on one or more of the following features: a partial (focal) onset or showing focal features during the seizure, prolonged duration (greater than 10–15 minutes), and recurrent within 24 hours or within same febrile illness.

In this study, patients referred to Mofid children's hospital and admitted with final FC diagnoses were investigated.

**Materials & Methods**

Data of patients, admitted in Mofid children's hospital with final diagnosis of FC, between April 2005 and April 2007, were recorded in specific formatted questionnaires and analyzed.

Based on inclusion criteria 342 patients were enrolled, 40 being excluded due to incomplete data, leaving data for 302 patients for analysis, which was done using SPSS software.

**Results**

Data of 302 children 178 (59%) male and 124 (41%) female with FC diagnosis over a period of two years were analyzed in this study. Age distribution is shown in fig. 1.

In this study 221 cases (73.2%) had simple febrile convulsion and 81 cases (26.8%) complex convulsion; three patients (1%) had status epilepticus. Family history of FC was positive in 28.8% including first, second and third-degree relatives. Body temperature at admission was above 38.5°C in 39.1% and equal or lesser than 38.5°C in 60.9%.

Normal results for neurologic exams were obtained in 88.4% of patients, while 11.6% had abnormal results.

Time of occurrence of convulsion after fever is shown in figure 2. Lumbar puncture (LP) was done in 134 children, with 9 cases having abnormal LP and of these, 3 (1%) were given a diagnosis of bacterial meningitis.

An EEG test was done in 74 patients, results being abnormal in 4 (1.3%) cases. Brain CT scan was performed for 51 cases, with abnormal results in 12 (4%) cases, of which 7 cases showed evidence of nervous problems in physical examination.

Leukocytosis (WBC >15000) was seen in 47 cases (15.6%), and anemia (Hb<11 mg/ml) in (110) 36.4%. Elevated ESR (>30 mm/h) was seen in 82 (27.2%) cases. Biochemical tests, including sodium, potassium, calcium and glucose were normal except hyponatremia in 9 cases, hypokalemia in one case and hypocalcemia in another.

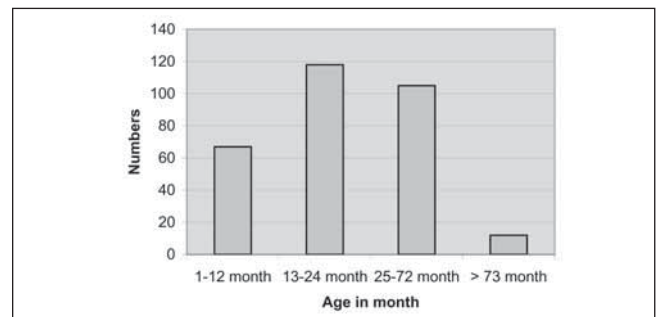


Figure1: Age distribution in patients

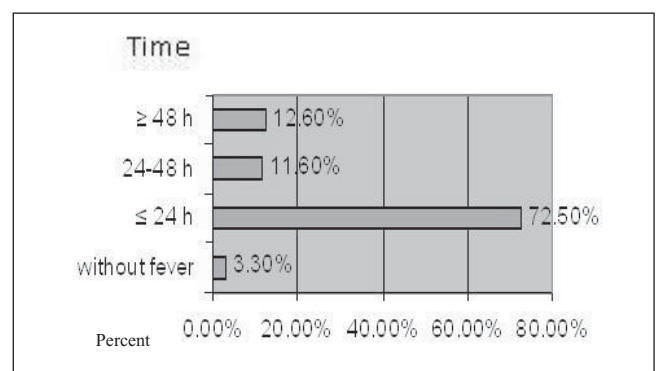


Figure2: Time of convulsion occurrence after fever in patients

**Discussion**

In our study, only 9 cases had abnormal LP, of which 3 patients had bacterial meningitis. As reported in several studies, the incidence of meningitis in children with febrile seizure is 2 to 5 percent (6,7,8). Another evidenced based review suggested that the probability of bacterial meningitis presenting as fever and seizure is

0.4–1.2% (9,10). This difference is probably explained by vaccinations in recent years in developed countries against hemophilus influenzae type b(Hib) and streptococcus pneumonia. On the basis of multicenter Iranian report ( Alborzi et al study- under publication) of low incidence of Hib meningitis in children under 5 years (12.5/ 100,000), the low prevalence of bacterial meningitis in our study (1%) is expounded.

In all the series reported, a majority of the children with meningitis had identified risk factors, e.g. seizure, seizure before fever and suspicious findings on neurologic examination (7).

LP should be strongly recommended in the infant younger than 12 months of age. The child between 12 and 18 months of age needs careful assessment, because the signs of meningitis, if any, may be subtle. If no suspicious findings are observed with history or neurological exam, LP is not necessary in a child older than 18 months. However, other studies have different recommendations, and advise that decision to conduct a LP should be tailored to each individual child's presentation and physician experience (10). In the absence of suspicious findings in the history(for example; vomiting or diarrhea) and physical exam (like hepatomegaly), routine determination of serum electrolytes, calcium, phosphorus, magnesium, or blood glucose levels are not necessary in infants older than 6 months with febrile convulsion(11). However in infants lower than 6 months these evaluations are important in the determination of the cause of seizure. On the other hand febrile convulsion below the age of 6 months is less frequent.

In our study, abnormal biomedical tests were seen in 11 cases; 9 cases with hyponatremia, one with hypokalemia and one case with hypocalcemia. An interesting point is that these abnormal electrolyte tests were not the etiology of seizures, because approximately in all of patients with hyponatremia, the Na level was above 120 mg/dl and also in the patient with hypocalcemia the Ca level was above 7 mg/dl. However hypokalemia doesn't lead to seizure.

Brain CT scans and Electroencephalogram (EEG) have limited value in the evaluation of the child with febrile convulsion (8,12). In our study, brain CT was done in 51 cases and the results, which were abnormal in 4%,

and included patients with status epilepticus. Dodson considered MRI in the diagnostic evaluation of the child who presents with status epilepticus, whether febrile or not (13).

In a case-control study carried out by Kobrinski and colleagues, anemia was found in 25.1% and 26.6% in the case and control groups respectively (14). We found anemia in 36.4% of our patients, which we believe to be related to the prevalence of Iron Deficiency Anemia in Iran. Different studies in Iran showed the prevalence of Iron Deficiency Anemia in women and children is between 30 to 50 percent (15,16,17).

Based on our findings, in the child diagnosed with febrile convulsion, especially simple febrile convulsion, there is no need for more paraclinical evaluation or for money to be spent unnecessarily, unless there are other indications for more paraclinical studies.

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