Recurrence risk after a first febrile convulsion

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ABSTRACT

Objective: Fever is the most common cause of convulsions, in infancy and childhood. Parents usually are concerned by the risk of recurrence. Our aim is to determine this risk of subsequent convulsions within the first year of the first episode of convulsion.

Methods: This is a prospective study over one year, May 97 to April 98 in which all children with first febrile seizure were enrolled.

Results: There were two hundred and thirty six children who had their first febrile convulsion within the study period. Male-to-female ratio was 1.2:1; the mean age at onset was 19 months (standard deviation 14.4). Generalized seizure occurred in 95.6% of the patients with an average duration of 7 minutes (SD 6.4). Ten percent of patients needed anticonvulsant drugs to stop convulsion. Seizure clusters occurred in 13.6 %, and complex febrile seizure was noticed in 21%. Family history was positive for epilepsy in 6.6% and febrile convulsions in 22%. Recurrence within a year from onset occurred in 52 (21%) of the patients. Factors associated with recurrence were: male sex, as male to female ratio was 2.25:1 (P=0.02) and history of seizure clusters, 23/52, 44% (P= 0.00001)

Conclusion: Risk factors for recurrence noted were male sex, and complex febrile seizures.

Keywords: Febrile convulsion, epilepsy, recurrence, risk factors.

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It has long been known that some infants and young children are susceptible to convulse in a setting of acute febrile illnesses. Seeing their child developing the very first convulsion the helpless parents are psychologically traumatized. They become quite concerned about the likelihood of child death during an attack and means to prevent it. Therefore, the risk of recurrence and possibility of development of epilepsy obsess them in the future. The physician treating an infant with his first febrile convulsion (FC) usually would like to rule out other causes which include central nervous system (CNS) infection, acute encephalopathy,[1] hemolytic-uraemic syndrome, toxic causes, septic embolization, shivering and delirium, reflex anoxic seizure[2,3] and malaria in some countries. FC has been defined as "an event in infancy or children usually occurring between 3 months and 5 years of age, associated with fever but without evidence of CNS infection or other definable causes. Seizures with fever in patients who have suffered previous non-febrile seizures are excluded. FC are to be distinguished from epilepsy, which is characterized by recurrent non-febrile seizures".[4] The incidence of FC is 2-5%[5-11] in children below five years. In certain communities

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figures have been reported as high as 9% in Japan and 15% in Mariana Island.[12] The study was carried out to know the incidence of the recurrence and its risk factors among our community.

Methods. All patients who presented to Pediatric Emergency Center (Pediatric Department, Hamad hospital) with a history of a first attack of FC within the year of study May 96 to April 97 were included in a prospective study to determine the risk factors of recurrence and clinical features. A house officer who collected the data saw all patients at pediatrics emergency unit and then the patient was referred to neurology unit of Hamad medical hospital. The hospital gives health care for all people who live in Qatar. The data collected included: age at onset, sex, degree and duration of fever (rectally checked), seizure duration, description and recurrence of seizure within 24 hours, and if the drugs were used to terminate the attack. In addition to physical examination, developmental history, pre and perinatal events were also collected. CBC, electrolyte, urine were performed for all patients. Other investigations were performed selectively. Spinal tab was performed in 17 patients (8%). Family history of epilepsy and febrile convulsion was obtained. All patients were followed up every two months and some by telephone (30 patients), which were contact by the resident doctors. None of the patients dropped out from the study. Results were statistically studied by statistical package of social science (SPSS) methods and contingency (2*2) test.

Results. ***Age and sex.*** A total of 236 patients were included in the study: 128 male, 108 female (ratio 1.2:1) (49%). Though the mean age at onset was 19 months (2-120), but 154 patients (66%) were between 7 and 18 months at onset. Two hundred and 10 (90%) patients were between 7 and 36 months. However, 8 patients (3%) were below the age of 6 months and 5 (2%) were above the age of 5 years (Table 1). Febrile seizures were generalized in character in 222 patients (96%), partial and secondarily generalized in 9 patients (4%) and undetermined in 5 patients. In 207 patients (90%) the seizures were self-limited and in 22 (10%) drugs were needed to abort the attack. The mean duration of the seizures (Table 2) was 7 minutes (range 0.5-30). In 217 patients (93.5%) the duration was less than 15 minutes, and in 15 patients (6%) the duration was between 15 and 30 minutes. There was a history of more than one attack in the first 24 hours in 27 patients (14%). Four patients (2%) had post-ictal weakness. Eight patients had partial seizure (3%). Complex febrile seizures occurred in 46 patients (21%). Fever was < 38.5°C in 13 patients (5.5%), and between 38.5-39.5°C in 37 patients (16%) and > 39.5°C in 186 patients (79%). The duration of fever was < 24 hours in 176 patients (75%) and >24 hours in 56 patients (24%). Family history showed parental consanguinity in 66 patients (31%). Febrile convulsion was reported in 53 (22%) of the relatives of the patients. Twenty two boys (17%) and 31 girls (29%, p =0.4) were more affected, contrasting with 2 mothers (0.9%), fathers (0%), 6 cousins (2%) and 2 uncles (0.9%). Epilepsy was found in 15 (7%) of the relatives while epilepsy and febrile convulsion was reported together in 6 patients (3%). Prenatal, perinatal and neuro-developmental histories revealed that there were gestational problems (hypertension, bleeding, premature contraction, diabetes, fever) in 39 (16.5%) of the patients, prematurity in 21 patients (9%), abnormal birth (cesarian section and breech delivery) in 44 patients (19.5%) and neonatal problems (sepsis, respiratory distress, neonatal jaundice) in 37 patients (15.5%). Neuro-developmental history was abnormal in 8 patients (3%), mainly delayed motor development and speech suggestive of cerebral palsy. There was no patient with mental sub normality

Investigation. Complete blood count showed anemia (hemoglobin lower than the normal range for age) in 35 patients (16%), leukocytosis in 93 patients (42%), but none had leukopenia. Elevated ESR in 24 patients (11%), hypocalcemia (< 2.2 mmol\l) was found in 3 patients (1%), and hyponatremia (< 130 mEq\l) in 1 patient. CSF study was performed in 17 patients (7%) and it was normal. Recurrence of seizures (Table 3), occurred within a year from the onset in 52 patients (22%). They were 36 male, 16 female (ratio 2.25:1); mean age at onset was 19 months (5-68) and mean duration for the seizure was 6.2 minute (range 0.5 - 30). In 5/52 patients, (10%) convulsions lasted >15 minutes. Fever (<38.5°C) was found in 5 patients (10%), recurrence within the first 24 hours occurred in 23 patients (44%), post-ictal weakness in 1 patient (2%) and partial fit in 2 (4%). Pematurity was found in 2 patients (4%). Family history of febrile convulsion was found in 23 patients (12%) and epilepsy in this group with recurrence was found in 5 patients (10%). Neuro-developmental delay was reported in one patient.

Discussion. Sex and age. The males outnumbered the felames with ratio of 1.2:1, this finding is similar to previous studies 1.6-1.2:1.9,13,14 febrile convulsions are age-dependent with a similar distribution curve in several studies. (Table 1). Very few cases occur below the age of 5 months and 85% occur before the age of 4 years. occasionally late first seizures are seen up to 7-8 years, median age varies between 17-23 months. Unilateral and severe febrile convulsion occur earlier than those that are brief and bilateral (16 vs 21 months).15. In our study the mean age at onset was 19 (2-120 months), while only 3% were less than six

Table 1 - Age at onset.

Age at onset (months)	Number of patients
1-6	8
7-12	79
13-18	75
18-24	34
24-26	22
36-48	7
48-60	6
60-120	5

Table 2 - Duration of seizures.

Duration in minutes	Number of patients (%)
<5	154 (66)
6-0	41 (18)
11-15	22 (9)
16-20	6 (3)
21-35	1 (0.04)
26-30	8 (3)

months old and this is less than 6% reported in the literature.

Seizures. In a previous study simple febrile convulsions were 4 times more than complex febrile convulsions[17] which was similar to our study. The mean duration of seizure was 7 minutes (range 0.5-30, (Table 2) Long-lasting seizure > 30 minutes was not found in our study, variable incidence between 18% and 35% is reported.[18,19,21-23] Most long lasting seizure was 7 minutes (70%-75%) are the initial seizure.[24-26] They study showed that 27 patients (14%) had more than one attack in the first 24 hours slightly less than 16% reported by others.[27]

Fever. Temperature above 39.5°C was recorded in 79% of our patients. In one study[18] 75% of children had temperature of or > 39°c at time of seizure. The duration of feber was less than 24 hours in 75% of patients. The rate of rise of fever is thought to be important in causing febrile convulsion by some[28] but disputed by others.[29,30]

Family history. Consanguinity of parents, which is common in Arabs communities, was found in 31% of patients. The study showed that epilepsy rate is 7% among relatives of febrile convulsion, a rate higher than general populations like previous studies.[31-32] History of febrile convulsions among the first-degree relatives was found more common in brothers (17%) and sisters (29%), p0.05) than other relatives. Febrile convulsions are familial conditions as it occurs with increased frequency iin family members of a patient with febrile convulsion.[33-36] Tusboi found similar incidence (22%) among sibling but higher figure among parents (17%).[11,12] Aicardi and Chevrie found an incidence of 31% in first degree relatives.[24,25] The empiric risk for further

Table 3 - Risk factors for recurrence.

Risk factors	52 patients with recurence (%)	184 patients without recurrence (%)	
Clusters	23 (44)	4/146 (3)	P=0.00001
Sex: M:F	36:16	92:92	P=0.02
Temperaures <38.5	5 (10)	8/184 (4)	P=0.06
Prematurity	2 (4)	19/176 (11)	P=0.21
Family history of febrile convulsion	12 (23)	51/176 (29)	P=0.40
Mean duration of seizure in minutes	6.2	7	P=0.48
Family history of epilepsy	5 (10)	10/176 (29)	P=0.49
Post ictal weakness	1 (2)	3/174 (2)	P=0.61
Partial seizure	2 (4)	7/176 (4)	P=0.69
Development	1 (2)	7/184 (4)	P=0.81
Mean age at onset (month)	19.1	18.9	P=0.9

offspring in a family with one affected child is approximately 10%. It is higher if one parent has had febrile convulsion, and this rises to 50% if one parent and one offspring have had febrile convulsion.[37] Most studies suggest a dominant mode of inheritance with reduced penetration and variable expression, [9,38-40] or polygenic mode,35 the later being currently preferred. Anderson et al[41] and Rich et al42

proposed that a different mode of inheritance may apply to cases in shich the proband has had 3 or more febrile convulsions, in such cases autosomal dominant transmission seems likely where as multi-factorial model fit better patients with <3 seizures. In 3% of patients, there was a combined family history of febrile convulsion or influence the clinical expression and prognoses.[22,25,43,44] Our study showed gestational problem in 16.5%, prematurity in 9.5% abnormal birth in 19.5% and neonatal problems in 15.5% of patients. These findings parallel what obtains in our neonatal unit. Initial development has a definite impact on the expression and outcome of febrile convulsions.[44,45] Wallace considered febrile convulsions as a possible indication of life long developmental defect of pre and perinatal origin.45 Developmental defects associated with complex febrile convulsions, and have less favorable outcome.[46,47] We recommended CSF study in first febrile convulsion in patients below the age of 18 months and when clinically indicated, however, only in 10% of paients (<18 months) CSF study were carried out. No patient was found to have neutropenia as it was thought that such a disease was associated with febrile convulsions in 14-20%.

Recurrence and risk factor. Recurrence occurred in 52 patients (22%) within the year in our study. (Table 3). Approximately 25-37 % of patients with febrile convulsions will experience at least one recurrence.[18,21,49-51] The mean age at onset for patient with recurrence was 19 months (SD±0.17). The risk for recurrence for infants below one year was 50% and above one year was 28%.[47] Gender was significant as the boys out numbered the girls in the group with recurrence, a male to female ratio of 2.25:1 compared to 1:1 (p=0.02) in the group without recurrence. Patients with cluster onset had recurrence in 44% Vs 3% (p=0.00) in those without recurrence. High risk of recurrence was found in-patients with low temperature at time of seizure.[52] Other factors like duration of seizure, neuro developmental status, Perinatal events, family history of febrile convulsion was not found to be significant risk factors.

In conclusion, our study showed that male sex; and complex febrile seizure (recurrence within 24 hours), were risk factors for recurrence of first febrile convulsion. However family history of epilepsy and low-grade temperature <38.5 c at time of seizures could be possible risk factors for recurrence.

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