

Febrile Convulsions in Children: Demographic Features, Causes and Seasonal Pattern

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Received: 15 July 2016 Accepted: 23 May 2016

Abstract

Background and Objectives: Febrile convulsion (FC) is the most common seizure disorder in childhood period. Some studies have suggested association between seasons and occurrence of FC. This study was designed to determine demographic features, causes and seasonal variations in cases with FC.

Method: In this descriptive, cross sectional study, 282 children 6- 60 months with FC were admitted to the Neurology ward of Ali-Asghar Children's Hospital from 2009–2013. They were evaluated about age, gender, type (simple, complex), and recurrence of seizures, family history of FC and epilepsy, diseases and seasons on admission.

Findings: A total of 282 patients with diagnosis of FC were admitted to our center. Of these 282 patients, 175 (62%) were male. The mean (SD) age was 24.34 ± 14.64 months. There were simple, complex, and recurrent FCs in 208 (74%), 74 (26%) and 58 (21%) of patients, respectively. Positive family history of FC was found in 83 (29.5%) and epilepsy in 38 (13.5%) of cases. The disease affected 212 (75%) of cases with respiratory and 70 (25%) of cases with non-respiratory manifestations. Most patients admitted in winter.

Conclusion: According to our findings, FCs have seasonal pattern associated with febrile respiratory events.

Keywords: Child, Febrile Convulsion, Season

Introduction

Febrile convulsions (FC) are the most common form of seizures in 2-5 percent of children and more frequent in age of 6 months to 5 years (1,2). They occur during a febrile disease and it is necessary to rule out central nervous infections (3,4). Although FCs have genetic pattern with high recurrence rate in cases with positive family history, main pathogenesis is unknown (5). Fever is usually due to respiratory system infections including otitis media, pharyngitis and sinusitis. Other causes are urinary system infections, gastroenteritis, roseola infantum and post vaccination (6). Human herpes virus type 6 (HHV-6) that is known as roseola infantum (6th disease) leads to 26 to 43 percent of first episode of FC in young children (7). Although viral infections are majority causes of FCs, acute otitis media (AOM) usually occur following some bacterial infection and lead

to febrile seizures (6). Body temperature during a febrile disease rises and may in 38 degree of centigrade lead to FCs with increasing risk of occurrence (8). Regulation of body temperature is undertaken of the suprachiasmatic nucleus in the anterior part of hypothalamus. Changes in light exposure affects mentioned nucleus and coordinates some circadian rhythms such as sleep, hormone secretion and behavior (9,10). Some studies have suggested that melatonin is secreted from pineal gland in darkness and has role in FCs (11). Because this type of seizure occurs in some seasons with higher frequency and has circadian rhythm, it is noticed in some research (9,10,11).

This study was designed to determine demographic features, causes and seasonal patterns in patients with FCs.

Table 1. Frequency of febrile causes in the patients

Diseases	Male N=175	Female N=107	Total N=282	P value
Upper respiratory infection	143	73	216	0.001
Lower respiratory infection	6	0	6	
Gastroenteritis	14	12	16	
Fever without localizing sign	9	12	21	
Urinary Tract Infection	3	10	13	

Methods

This descriptive, cross sectional study was performed on admitted children with diagnosis of FC in Ali-Asghar Children's Hospital in Tehran, Iran from 2009 to 2013. The project was approved by ethical committee of the Iran University of Medical Sciences. Two hundred and eighty two patients 6months to 5 years old enrolled the study. Cases with history of meningitis, encephalitis, electrolytes imbalance, metabolic disorders, neurodevelopmental delay, abnormal neurologic examination and former afebrile seizure were excluded. Data about age, gender, type of seizures (simple, complex), history of previous FC (recurrence), family history of FC or epilepsy in patients' relatives, was collected. Another data including month, season and diseases on admission was recorded. The collected data was analyzed by software of SPSS 16. Descriptive statistics such as frequency, mean and standard deviation and analytic statistics including Chi-square (for qualitative variables), t-test (for quantitative variables) was calculated. P values less than 0.05 was considered significant.

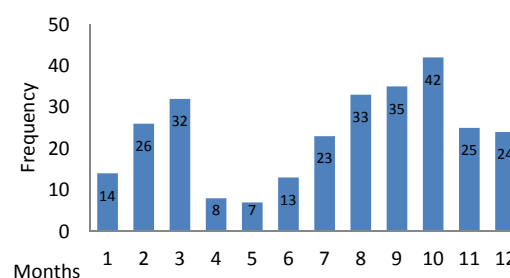
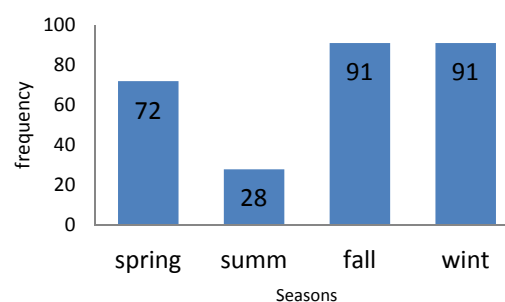
Results

During the study, total of 282 patients with diagnosis of FC were admitted to our center. Of these 282 patients, 175 (62%) were male. The mean age was 24.34 ± 14.64 months. One hundred sixty one (57%) were under 2 year of age. There were simple, complex, and recurrent FCs in 208 (74%), 74 (26%) and 58 (21%) of patients, respectively. Forty nine (66%) of cases under 2 years old had complex FC and there was a significant relation between age under two year and complex FCs ($p=0.04$). Family history of FC was positive in 83(29.5%) and epilepsy in 38(13.5%) of cases. Diseases of 212 (75%) of cases was with respiratory and 70 (25%) of cases with non-respiratory manifestations. Among 282 of FCs, 182(64.5%) cases occurred in cold seasons (fall and winter) and most cases in 10th and 9th months of year (15%, 12.5% respectively). Upper respiratory diseases included common cold 184 (65.2%), acute otitis media 14 (5%), sinusitis 6 (2.1%) and phar-

ngingitis 3 (1.1%) of cases. Lower respiratory tract infection included pneumonia in 6 (2.1%) of patients. Other diseases lead to fever were gastroenteritis 31(11%), fever without localizing sign 25(8.9%), and urinary tract infection 13(4.6%) of cases. There was a significant relationship between gender and causes of fever (Table 1). Frequency of FCs in months and seasons have been shown in Figs. 1 and 2. There was not a significant relationship between causes of fever and month or season of admission ($p>0.05$). Also it was not seen relation about age, gender, history of FCs or epilepsy in patients' relatives with months and seasons ($p>0.05$).

Discussion

Febrile seizures are convulsions that occur between the age of 6 and 60 months during a febrile disease excluding CNS infections (1). In this study mean age of patients was 24.34 ± 14.64 months. Similar to us, in Esmaili et al reported mean age

Fig 1. Frequency of febrile convulsions based on month of admission**Fig 2.** Frequency of FCs based on Season of admission

of 25.24±15.40 months (7). Another studies recorded mean age of cases 29.09±18.24 months (9). In our study 57 percent of patients were under 2 year of age and most cases of complex FCs were in this group. Our results were the same as Esmaili et al (7). In our study, upper respiratory tract infections specially common cold was the most common of febrile disease like as many previous studies (1,7,12,13). Like as some research, our result showed that second common febrile disease was gastroenteritis (7,12).

Evaluation of seasonal pattern of FCs demonstrated that most of seizures occurred in fall and winter (summation 64.5%) and most in 10th (15%) and then in 9th (12.5%) months of year. It is mentioned to worth that age and gender did not have relationship with seasons. These findings were like as Khoda Panahandeh et al study (9). Higher frequency of FCs in cold seasons can be due to higher incidence of respiratory infections. Influenza virus during cold season is known as common cause for FCs but in our study evaluation from point of virology was impossible. It was one of our limitations but supportive treatment performed for all patients suspected viral infections.

Conclusion

According to finding of this study, FCs occurred more in age of less than 2 years and was higher in male cases. There was significant difference between age of less than 2 years and complex FCs. The most common cause of FCs was upper respiratory tract infections, especially common cold, and there was significant difference between male and female regarding causes of fever. Seizures were seen more in cold seasons.

Acknowledgements

We would like to thank personnel of medical record division of Ali-Asghar Children's Hospital.

Conflicts of interest: None declared.

References

1. Afsharkhas L, Tavasoli A. Renal Function in Children with Febrile Convulsions. *Iran J Child Neurol.* 2014;8(4):57-61.
2. Afsharkhas L, Kalbassi Z. Electroencephalography in Children with Simple, Complex, and Recurrent febrile seizures. *Razi J of Med Sciences.* 2015;22(133):59-63.
3. Tavasoli A, Afsharkhas L, Edraki A. Frequency of Meningitis in Children Presenting with Febrile Seizure in Ali- Asghar Children's Hospital. *Iran J Child Neurol.* 2014; 8(4):51-56.
4. Afsharkhas L, Hoseinynejad N, Kalbassi Z, Khalessi N. Cerebrospinal fluid indices in children with febrile convulsion. *IJCA.* 2016; 2 (2): 24-26.
5. Saghazadeh A, Mastrangelo MN. Genetic background of febrile seizures. *Rev Neurosci* 2014; 25(1):129-61.
6. Houshmandi MM, Moayedi AR, Rahmati MB, Nazemi A, Fakhrai D, Zare Sh. Human Herpes Virus Type 6 and Febrile Convulsion. *Iran J Child Neurol.* 2015;9(4):10-14.
7. Esmaili Gourabi H, Bidabadi E, Cheraghalipour F, Aarabi Y, Salamat F. Febrile Seizure: Demographic Features and Causative Factors. *Iran J Child Neurol Autumn* 2012; 6(4): 33-37.
8. Behrman E R. Nelson Textbook of Pediatrics. In: Bleyer A, Ritchey A.K. Nephrology section. 19th ed. 2011;P:1731-1845.
9. Khoda Panahandeh F, Vahid Harandi N, Esmaili Jazanabadi F. Evaluation of seasonal variation and circadian rhythm of febrile seizures in children admitted to the pediatric ward of Rasoul -e-Akram Hospital. *J Iran Med science.* 2008;15(59):59-65.
10. Manfredini R, Vergine G, Boari B, Faggioli R. Circadian and seasonal variation of first febrile seizures. *J Pediatr.* 2004;145:838-9.
11. Mikkonen K, Uhari M, Pokka T, Rantala H. Diurnal and seasonal occurrence of febrile seizures. *J Ped Neurol.* 2015;30: 1-4.
12. Esmaeil Nia T. The causes of fever in children with Febrile Convulsion, Amirkala Pediatric Hospital. *JBUMS.* 2000; 2 (5):44-48.
13. Fallah R, Akhavan S, Mir Sadat Nasser F. Clinical and demographic characteristics of first febrile seizure in children. *J Shaeed Sdoughi Uni Med Sci Yazd.* 2009;16(5):61-5.