Demographic Criteria and Causes of Convulsive Disorders in Children below 5 Years of Age Admitted to Al-Elwia Pediatric Hospital, Baghdad

Ali Abdul-Razak Obed

Abstract

Background: Acute seizures are common pediatric admissions to hospitals and a risk factor for neurological and cognitive impairment and epilepsy.

Aim of the study: To determine the clinical criteria of convulsive disorders in children below 5 years of age with regards to the etiology, age of onset and risk factors for the development of seizure.

Methods: A cross sectional study done on 285 patients with convulsive disorders admitted to Al-Elwia pediatric hospital from the first of December 2009 to the 30th of November 2010.Children more than 1 month – 5 years included in the study (the neonates were excluded).History was taken from the family regarding the age of onset of first seizure, recurrence, developmental delay and positive family history of seizure. Examination was done on all patients to document fever, signs of meningeal irritation, and for presence of dysmorphic features. Investigations were sent in the form of complete blood count, lumbar puncture, blood glucose, serum calcium, serum magnesium and electrolytes in those patients suspected of having acute symptomatic seizure. Electroencephalography was done to diagnose type of seizure along with the clinical manifestations. Imaging studies as computerized tomography were done for selected cases.

Results: of 285 children presented with convulsion, 155 had febrile seizure, 69 with epilepsy, 61 had acute symptomatic seizure male to female ratio was 1.4:1. The peak age of onset among patients with febrile seizures was in the second year of life, while that for epilepsy and acute symptomatic seizures was in the first year of life. There was a history of prematurity in 10% of cases. There is positive family history of febrile seizure in 20% of cases and of epilepsy in 11% of cases. Twenty six patients had cerebral palsy and 23 patients had status epilepticus.

Conclusion: In this study we find a higher frequency of febrile seizures than epilepsy and acute symptomatic seizures. The frequency of epileptic and acute symptomatic seizures was greatest in the first year of life, while that of febrile convulsion peaked in the second year.

Key words: seizure, children, epilepsy, acute symptomatic seizure.

Introduction:

Seizures are the most frequently occurring neurological condition in children, and have a major impact on child's development and cognitive function. [1]

Differentiation of febrile seizures from acute symptomatic seizures secondary to central nervous system infection or seizures triggered by fever in children with epilepsy is essential.[2]

In general, seizure: Is defined as a transitory disturbance in consciousness or in motor, sensory or autonomic function caused by uncontrolled electrical discharges in the brain.[3]

Febrile convulsion defined as a seizure in children aged 6 months to 6 years, associated with fever arising from infection or inflammation outside the central nervous system in a child who is otherwise neurologically normal.[4,5]

Worldwide febrile convulsions are the most common form of acute convulsion in children, occurring in 2-5% of young children in North America and Europe, 6-9% in Japan, 5-10% in India.[1,5, 6]

While the majority of febrile seizures are simple (70-75%), about 9-35% of febrile seizures are complex.[7] The incidence peaks at 18 months of age, prevalence in boys is slightly higher than girls.[8]

On the other hand, Epilepsy defined as two or more afebrile seizures unrelated to metabolic disorders or acute central nervous system insult.[9]

In 2005, Fisher and colleagues suggested a redefinition of epilepsy as having experienced at least one seizure associated with an enduring alteration of the brain that increases the likelihood of future seizures, neurologic, cognitive and social disturbances.[10]

International League against Epilepsy at 1993 define single seizure episode as a single unprovocative seizure or cluster of seizures occurring in a time interval below 24 hours.[9]

The prevalence of epilepsy vary from 4 to 10 per 1000 population (the lower figures in developed countries, while the higher figures in developing countries).[11]

However epidemiological studies in developing countries have a particular methodological difficulty including case ascertainment, definition and classification.[21]

About 55-75% of childhood epilepsy is of unknown cause, most common human epilepsies are multifactorial disorders and environmental risk factors contribute to the seizure phenotype.[13]

The intrauterine environment play important role in the development of neurologic disorders such as cerebral palsy, which further increases risk of seizure disorders.[14]

Preterm delivery and low birth weight regarded as other risk factors for seizure disorders like febrile seizure.[15]

Many studies have also found that the risk may be increased by underlying brain disorders, and developmental delay.[7]

Family history poses an important risk factor for both febrile seizures and epilepsy, in which the risk of epilepsy is increased threefold for individuals with a first-degree relative who has the condition.[16] On the other hand the risk of FS was increased in

relatives of children with recurrent FS (12%) and the risk of FS in siblings (10%).[17]

Acute symptomatic seizure defined as a seizure occurring within a week of an acute brain insult (trauma, infection, toxic, metabolic or vascular insult).[18]

In many epidemiological studies, acute symptomatic seizure disorders are usually studied in association with epilepsy, and few such studies have focused on children.[19]

Most cases of acute symptomatic seizures occur before the age of 3 years, because (fever, metabolic disturbances, head trauma, central nervous system infection and acute encephalopathy) occur predominantly in early childhood.[1]

The aim of our study is to find out the demographic criteria of convulsive disorders in children below 5 years of age with regards to the causative factors, age and sex distribution and to find the relative risk factors behind convulsive episodes.

Patients and methods

A cross sectional study done on 285 children with convulsive disorders admitted to Al-Elwia pediatric hospital from the first of December 2009 to the thirtieth of November 2010. Participants include febrile and non febrile children with convulsion from more than one month to 5 years age (neonates were excluded from the study).

Data was collected regarding sex, age of onset of first convulsion, recurrence, duration of fit, history of prematurity, developmental mile stone and presence of positive family history of febrile seizure or epilepsy.

Axillary temperature was taken to all patients. Thorough physical examination was done, including neurological and systemic examination to look for any symptomatic cause.

A simple febrile seizure defined as a seizure in infant and children between the age of 6 months to 6 years, in association with fever but without evidence of central nervous system infection.

Patients regarded having complex febrile seizure if they have focal onset, duration more than 15 minutes, or multiple episodes in the same illness.[20]

Epilepsy diagnosed according to the clinical features, having two or more unprovocative seizures, and findings on EEG.[7] Brain computed tomography was sent as indicated. Lumbar puncture was done in febrile patients suspected of having CNS infection. Complete blood count was done in all patients.

Blood glucose, serum calcium, magnesium, and electrolytes were sent in those patients suspected of having symptomatic seizure.

The chi-square goodness-of-fit test was used for analysis of the association between the cause of the seizure and the age of onset.

Results

During the study period, 285 children with convulsive disorders admitted to the hospital, the sex incidence was slightly higher in male (59%) with male to female ratio of 1.4:1. Of the total 285 patients, 155 patients (54%) diagnosed with febrile convulsion, 69 patients (24%) diagnosed with epilepsy, and 61 patients (22%) had acute symptomatic seizure.

Febrile seizure was the first attack in 110 patients (71%), and 45 patients (29%) had recurrent attacks. Simple febrile seizure found in 142 patients (90%), while 15 patients (9.5%) had complex febrile seizure, of 69 patients diagnosed with epilepsy, 33 patients had active epilepsy, 10 patients had single unprovoked seizure, and 26 patients had cerebral palsy.

Table 1: The criteria of patients admitted with convulsive disorders

Cause of seizure	Age groups										Total	P value
	>1mo-1 year		>1-2 year		>2-3 year		>3-4 year		>4-5 year			
	No	%	No	%	No	%	No	%	No	%	No.	
Febrile Seizure	44	28.4	58	37	25	16	18	12	10	6.6	155	0.0001
Epilepsy	42	61	13	19	6	8.6	4	5.7	4	5.7	69	0.0001
Acute symptomatic seizure	50	82	7	12	2	3	…..	….	2	3	61	0.0001
Total	136	48	78	27	33	11	22	8	16	6	285	

As shown in Table 1, the peak age frequency for febrile seizure was in the second year of life(37.4%), while the peak age frequency for epilepsy and acute symptomatic seizure was in the first year of life(61%, 82% respectively). P value was 0.0001

Meningitis and encephalitis were among the most common causes of acute symptomatic seizure, found in 23 patients (38%), then hypocalcaemia in 22 patients (36%), hypoglycemia in 9 patients (15%), three patients aged 2-3 months presented with intracranial hemorrhage diagnosed by CT scan, two patients diagnosed with hemolytic uremic syndrome and two patients had pertussis.

History of prematurity was found in 29 patients (10%), and 16 patients (5.6%) presented with status epilepticus. Twenty percent (57 patients) had a positive family history of febrile seizure and eleven percent (32 patients) had positive family history of epilepsy.

Discussion

In the present study, seizure was investigated among children under five years of age; we found that febrile seizures are the most common convulsive disorder in young children accounting for 55% of all seizure disorders. This is similar to previous reported incidence of febrile seizure between 48-50% among patients presenting with convulsion.[21, 22]

Simple febrile seizures were found in 142 patients (90 %), while complex FS found in 15 patients (9.5%). This is in agreement with other studies that reports the incidence of complex FS in the range of 9-35%.[23-25]

Our data revealed a peak age of onset of FS in the second year of life, while that of epilepsy and acute symptomatic seizures peaks in the first year of life, these findings are similar to previous studies on febrile and non febrile seizures. [7, 24, 26]

Most data support the unique age specificity of the maturating brain′s sensitivity to fever, this is explained by animal model that suggest there is enhanced neuronal excitability during the normal brain maturation. Another explanation is that this age group is mostly vulnerable to electrolyte abnormality or infection.[26, 27]

The overall sex incidence among the studied group showed a higher male incidence with a male to female ratio of 1.4:1.Prior studies also found that males accounted higher seizure prevalence than females[1, 4, 24, 28-29]

In this cohort, a predominance of idiopathic epilepsy in relation to symptomatic seizure was observed (24%), results similar to previous reports.[22, 23]

The study also demonstrated that 26 patients(37%) had cerebral palsy, in accordance with a study done by Milen P. et al showed that and 35% epileptic patients had associated neurological abnormalities or mental retardation.[30] Cerebral palsy and congenital malformations of the central nervous system, are associated with increased risk of epilepsy.[31]

The rate of acute symptomatic seizure in our study was 22%. Metabolic causes (hypocalcaemia and hypoglycemia) were among the predominant causes in 51% followed by central nervous system infection in 38%.

Previous reports demonstrate that acute symptomatic seizure incidence range from 11-35%, metabolic and CNS infection was among the predominant causes. [23, 27]

Status epilepticus is one of the most common life threatening medical emergencies in children that requires prompt intervention. Our study showed the frequency of status epilepticus was 5.6% in the range of 1.3-16% that is reported in previous studies.[32, 33]

Twenty nine patients (10%) with seizure disorders born as preterm babies and many studies had documented that risk of febrile seizures and/or epilepsy is increased with decreasing gestational age.[34, 35]

Twenty percent(57 patients) of our patients had a positive family history of febrile seizure and eleven percent(32 patients) had positive family history of epilepsy, this in accordance with Abuekteish F. et al study demonstrated that 13% of their patients had a positive family history of febrile seizure[36], while Al Zwaini E. reports that 35% of their cohort had positive family history of febrile seizure and 17% had a positive family history of epilepsy.[24] Al Rajeh S find that positive family history of epilepsy present in 24% of their patients.[3] Nermin A. showed that 25.8% of their epileptic patients had positive family history of epilepsy.[28]

Previous studies had observed strong association between positive family history of seizure disorder and epilepsy, on the other hand a family history of febrile seizure is associated with increased risk of recurrence.[37,38]

Limitation of this study is that it is a hospital based study; the attributable risk needs to be studied in depth by subsequent case-control studies. On the other hand, the need for further community studies is required.

Conclusion

In this study we find a higher frequency of febrile seizures than epilepsy and acute symptomatic seizures.

The causes of symptomatic seizures revealed a predominance of CNS infection and metabolic problems in young infants. The frequency of epileptic and acute symptomatic seizures was greatest in the first year of life, while that of febrile convulsion peaked in the second year, which was similar to previously reported studies.

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Correspondence address to:
Dr. Ali Abdul-Raze Obed
Senior lecturer at Al-Kindy College of medicine-pediatrics department
E-mail: aao_mayah@ yahoo.com
Phone no. 07901683801