Clinical Profile and Electroencephalogram Findings in Children with Seizure Presenting to Dhulikhel Hospital.

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ABSTRACT

Background

Seizure disorder is the most common childhood neurologic condition and a major public health concern. Identification of the underlying seizure etiology helps to identify appropriate treatment options and the prognosis for the child.

Objective

This study was conducted to investigate the clinical profile, causes and electroencephalogram findings in children with seizure presenting to a tertiary center in Kavre district.

Method

This was a hospital based prospective study carried out in the Department of Pediatrics, Dhulikhel Hospital, Kavre from 1st April 2015 to 31st March 2016. Variables collected were demographics, clinical presentations, laboratory tests, brain imaging studies, electroencephalography, diagnosis and outcome.

Result

Study included 120 (age 1 month to 16 years) children attending Dhulikhel Hospital. Majority of the patients were male (60.84%). Age at first seizure was less than 5 years in 75.83% of children. Seizure was generalized in 62.50%, focal in 31.67% and unclassified in 5.83%. Common causes of seizure were – Primary generalized epilepsy (26.66%), neurocysticercosis (10%) and hypoxic injury (6.6%) which was diagnosed in the perinatal period. Febrile seizure (26.66%) was the most common cause of seizure in children between 6 months to 5 years of age. Neurological examination, electroencephalography and Computed Tomography were abnormal in 71.66%, 68.92% and 58.14% cases respectively. Seizure was controlled by monotherapy in 69.16% cases and was resistant in 7.50% of the cases.

Conclusion

Primary generalized epilepsy and febrile seizure were the most common causes of seizures in children attending Dhulikhel Hospital. Electroencephalogram findings help to know the pattern of neuronal activity. Response to monotherapy was good and valproic acid was the most commonly used drug.

KEY WORDS

Children, electroencephalogram, seizure

INTRODUCTION

Seizures are the most common pediatric neurologic disorder with 4% to 10% of children suffering at least one seizure in the first 16 years of life.[1] The incidence is highest in children younger than 3 years of age with a decreasing frequency in older children. WHO estimates that out of the 50 million people with epilepsy in the world, 80.0% live in developing countries.[2] The incidence of a first unprovoked seizure was 61 per 100,000 compared to the incidence of epilepsy of 44 per 100,000.[3] In general, the incidence of epilepsy in developed countries is taken to be around 50 per 100,000 (range 40–70 per 100,000/year) while the incidence of epilepsy in resource-poor countries is generally higher in the range of 100–190 per 100,000/year.[4,5]

Etiological factors for childhood epilepsy are different from those for epilepsy occurring later in life.[6,7] In children, -perinatal insults, developmental deficits, genetic factors, degenerative CNS or other malformations and perinatal events (i.e., asphyxia and CNS hemorrhage) are all often identified as possible causes of epilepsy,[8-14] whereas cerebrovascular and degenerative causes have become recognized as possible causes in older age group.[15,16] Knowledge of the epidemiology of childhood epilepsy and of current functioning of children with this condition will help inform the development of systems of care that move beyond a narrow focus on seizure control to address implication of the condition for the child's social, emotional, and developmental well-being.[17]

There are limited studies on causes and outcome of acute episodes of seizure in developing countries. In this study, we therefore analyzed the prevalence of various etiologies, the clinical spectrum of seizure disorders, electroencephalogram findings and primary outcome of children with acute seizure disorder.

METHODS

This was a prospective hospital-based study conducted in the Department of Pediatrics, Dhulikhel Hospital. A total of 120 cases with seizure attending the Pediatric neurology clinic from April 1st 2015 to March 31st 2016 were included. Inclusion criteria were – children from 1 month to 16 years with or without fever and willing to participate in the study. The exclusion criteria were children with seizures onset after hospitalization and refusal to give consent.

Socio-demographic profile, birth history, development and family history and possible risk factors were recorded after informed and written consent from parents. All patients attending Pediatric Outpatient department or Emergency room with seizure were enrolled in the study after explaining parents or guardians about the study and need for basic investigations according to the nature of disease presentation. Detail anthropometric measurements and physical examination were done. Investigations like electrolytes, lumbar puncture, EEG and neuroimaging of the brain were done whenever required and results recorded in predesigned format.

Seizure classification was based on the Commission on Epidemiology and Prognosis, 1993 International League Against Epilepsy.[18] Febrile seizures were classified as simple or complex febrile seizures. A simple febrile seizure lasts less than 15 minutes, is initially generalized in nature, and occurs once during a 24 hour period. A complex febrile seizure lasts more than 15 minutes, has focal features at any time, or recurs within a 24 hour period.[18] EEG was reported by Pediatric neurologists and was considered to be abnormal when there was slow or spike waves or any epileptiform discharges. Anticonvulsant was selected according to the type of seizure and patients were followed up in Pediatric neurology clinic once every month. Compliance to the drug, complication of the drug and seizure control with the drug were recorded during the follow up.

The study was approved from the institutional review committee board of Dhulikhel Hospital.

RESULTS

A total of 120 children were included of whom the incidence of seizures among different age group was: less than 6 months 1(0.83%), 6 months to 5 years 68(56.66%) out of which 36(52.94%) cases were diagnosed as febrile seizure, 6-10 years 26(21.66%) and 11-16 years 25(20.33%) (Fig. 1). All the cases of febrile seizure presented between 6 months to 5 years of age except one which presented at 6 years of age. Majority of the patients, 73(60.84%) were males and 47(39.16%) were females with male to female ratio of 1.55:1 (Fig. 2). On the basis of onset of first seizure, 91(75.83%) of children experienced first episode of seizure when they were less than 5 years, and 15(16.48%) of which experienced it during the neonatal period. First episode of seizure that occurred before 5 years of age included all cases of febrile seizure except one who experienced the first episode at 6 years of age. This was followed by 22(18.34%) of children who had the first episode at 5-10 years of age and 7(75.83%) experienced it at older age of 11-16 years.

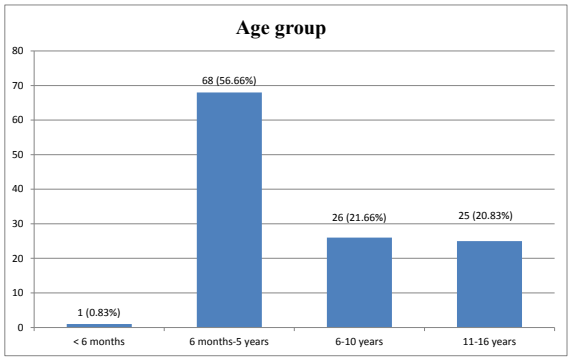

Figure 1. Age group of patients with seizure.

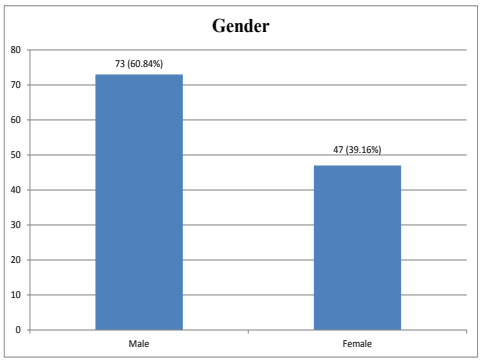

Figure 2. Graph showing gender of patients presenting with seizure.

Generalized seizures was predominantly seen in 75(62.50%) of the children followed by focal seizures which were present in 38(31.67%) of the patients. At the time of presentation, 78(65%) cases had previous history of seizure and 42(35%) cases presented with first episode in their lifetime. Fever was notably present in 50% of children at presentation, majority of cases (61.66%) were diagnosed as febrile seizure.

Among 120 cases, 97(80.83%) cases had uneventful postnatal period whereas 16(13.34%) had asphyxia due to meconium aspiration , cord prolapse and prolonged labour followed by preterm delivery in 4(3.33%) and 3(2.50%) cases were treated for meningitis during the postnatal period.

Table 1. Demographic data of patients presenting with seizure

	Number	%
Onset of first seizure		
< 5 years	91 (36 febrile seizure)	75.83
5-10 years	22 (1 febrile seizure)	18.34
11-16 years	7	5.83
Types of seizure		
Generalized	75	62.50
Focal	38	31.67
Unclassified	7	5.83
Past history of seizure		
Present	78	65
Not present	42	35
Fever		
Present	60	50
Not present	60	50
Birth History		
Normal	97	80.83
Asphyxia	16	13.34
Prematurity	4	3.33
Meningitis	3	2.50
Family History of seizure		
Negative	98	81.67
Positive	22	18.33
Development milestones		
Normal	85	70.83
Delayed	35	29.17

Table 2. Clinical examination

	Number	%
TONE	27	22.50
Increased	21	
Decreased	6	
POWER	13	10.84
1/5	1	
2/5	6	
3/5	2	
4/5	4	
REFLEXES	29	33.73
Absent	1	
Brisk	28	
BABINSKI PRESENT	17	19.76
HEARING AND VISION		
Normal vision and hearing	100	83.34
Defective hearing	08	6.66
Defective vision and hearing	12	10.00
ELECTROENCEPHALOGRAM		
Normal	23	31.08
Abnormal	51	68.92
Not done	46	38.33
CT SCAN		
Normal	18	41.86
Abnormal	25	58.14
Not done	77	64.16
MRI		
Normal	5	41.66
Abnormal	7	58.34
Not done	108	90.00

A positive family history of epilepsy was present in 22(18.33%) of the children. The history was most commonly seen among siblings i.e 14.16% and 4.17% among first degree relatives. Consanguineous marriage among second-degree relatives was present in parents of 12(10%) cases. Development milestone was delayed in 35(29.17%) cases but 85(70.83%) of the children had normal development as per their peers.

Detailed neurological examination was done in all the patients. Out of the 120 cases, 27(22.50%) had abnormality in their tone, 13(10.84%) had abnormal power, 29(33.73%) had abnormal reflexes (28 exaggerated and 1 with absent reflex) and 17(19.76%) cases had positive babinski sign.

Ophthalmology consultation and hearing assessment was done in all patients. Both hearing and vision was intact in 100(83.34%) cases. Defective vision and hearing was present in 12(10%) of the cases whereas 8(6.66%) had defective hearing but the vision was normal.

Electroencephalogram was performed in 74(61.66%) of cases. It was not done in the remaining cases as they were first episode of febrile seizure. Out of them, 23(31.08%) had normal findings. The most common finding was the focal epileptiform activity which was seen in 38(51.35%) cases, the left temporal region to be the most affected site followed by the generalized epileptiform activity in 11(14.86%) cases and encephalopathic changes was found in 2(2.70%) cases. Computed Tomography scanning of head was performed in 43(35.83%) cases and abnormality was detected in 25(58.14%) cases. The reasons for not doing a CT scan in the remaining 77(64.16%) cases was no indication and lack of regular follow up. MRI was done with indication in 12(10%) cases and 7(58.34%) were abnormal with most common finding of vascular malformation. No financial burden was given to the patients, all the investigations were done as per diagnosis need.

Primary generalized epilepsy (26.66) was the most common diagnosis made followed by neurocysticercosis (10%) and perinatal hypoxic injury (6.66%). Febrile seizure was the most common cause of seizure in children of age group 6 months to 5 years. The incidence of temporal lobe epilepsy, neurocutaneous syndrome and meningitis were equal in all patients (5%). Good seizure control was achieved in 83 (69.16%) with single anticonvulsant therapy and 9(7.5%) needed dual therapy. Patients with first episode of febrile seizure were not given any anti-convulsant drug i.e no therapy was given in 28(23.33%). The most commonly drug used in the patients was valproic acid and drugs like lamotrigine and levetiracetam were used as second line therapy. None of the patients had any side effect with the drug.

DISCUSSION

This study have shown high incidence of seizures in younger children with a decreasing frequency in older age group and more common in males.[19,20] Most of the children with seizures in this study were younger than 5 years. Males had higher prevalence compared to females which was comparable to other studies.[21-23] The reason for higher incidence in males may be the fact that most of the diseases are male dominant and seeking for medical help is also more common for male gender in our community. Majority (75.83%) of children experienced first seizure before the age of five years in this study. In other studies from Nepal, 63% and 40% of childhood seizure occurred in children less than five years.[24,25] This may be contributed to limited number of cases and higher incidence of febrile convulsion seen in this study. In this study, generalized seizure was commonest seizure type followed by focal type which is consistent with the findings in the study done by Prakash et al.[24] However the study findings could be biased due to the interpretation and history given by the parents or caretakers.

In this study, most of the children already had one or more episodes before presentation in comparison to those who presented with the first episode. Medical attention for the first episode of seizure was not done. The children were rather taken to traditional healers or to nearby medical shop by the parents. Positive family history, most commonly in siblings, was seen in 22(18.33%) of the children. In another study of 500 cases, a positive family history of epilepsy was present in 60% most common among siblings i.e. 34.30% and 3.80% among first degree relatives.[26]

Clinicians in developing countries may have ready access to only the most basic investigations hence the etiological diagnosis is often made on clinical grounds. If such diagnoses were supplemented with those made using the technology available in industrialized countries, the percentage of epilepsy cases with an identifiable etiology would increase considerably. Neuroimaging examines the relationship between abnormalities of brain function in epilepsy patients (seizures, impaired cognitive function, psychiatric co-morbidity etc.) and focal or more widespread brain pathology. CT is an important tool for neuroimaging as it offers an opportunity to investigate structural lesions as a cause of seizures with little morbidity. CT scan was abnormal in 58.13% of the investigated cases in our study. It was limited to certain number of patients only when indicated. This is similar to a study where 42.4% of the patient had an abnormal CT scan.[24] In a study by Gibbs et al, CT scan was abnormal in 21% of the cases investigated.[27] Ring enhancing lesion was the most common neuroimaging findings detected by CT scan in our study which is similar to the findings of other studies.[24,28]

Diagnosis of epilepsy is based upon clinical data. But the EEG remains absolutely necessary for proper management of epileptic patients by the neurologist both in consultation and in hospital practice. EEG was done in 61.66% of the cases and 68.91% of them had abnormal findings. Children with first episode of febrile seizure did not undergo EEG or any neuroimaging. In a study done by Prakash et al, 80.4% of investigated cases had abnormal EEG findings.[24] EEG and neuroimaging was done only in high risk patients and when indicated.

In this study, good seizure control was achieved in 69.16% cases out of 120 cases with known outcome. Seizure was resistant to initial therapy in 7.50% of the cases. Published literature shows that up to 70% of childhood epilepsies will respond to the first or second drug.[29] The compliance to the drug in our study was good in all the patients.

The limitation of the study comprises small sample size and EEG and neuroimaging done only on selected patients. As history was taken from parents and caretakers, type of seizure may not be well described.

CONCLUSION

Primary generalized epilepsy and febrile seizure were the most common causes of seizure in children presenting to the hospital. Children less than 5 years of age and male gender were most commonly involved. Neurological examination and investigating modalities were abnormal in majority of the cases. Seizure control was achieved in majority of the cases with valproic acid with only few requiring dual therapy. Detailed history and appropriate investigation can lead to proper management of a child with seizure and help to reduce the comorbidities.

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