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Original Article

Epilepsy in children: an epidemiological study at Kathmandu Medical College Teaching Hospital Kathmandu

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Abstract

Objectives: To analyze the relative frequencies of various epileptic seizures and to study the age at onset of different seizure types in Nepalese children. **Design:** Prospective study. **Setting:** Hospital outpatient based in Kathmandu, Nepal, between November 2001 to October 2002. **Participants:** 50 children diagnosed as epilepsy excluding neonatal and febrile seizures. **Main outcome measure:** Diagnosis and classification of cases according to the International Classification of Epilepsy of the International League Against Epilepsy [ILAE] and number of patients in each category with various ages at first seizure. **Result:** Generalized seizures (78%) were 3.54 times commoner than partial seizures (22%). Most frequent seizure types were generalized tonic clonic (36%), tonic (16%), complex partial (14%), atonic (12%) and absence (10%). Generalized clonic, simple partial and partial with secondary generalization, each had less than 5% frequencies. In 40% cases the first seizure occurred when aged between 2-5 years. In partial seizures the peak age at onset was observed below 6 years while primary generalized seizure was more frequently seen in age group 2-10 years. **Conclusion:** More paediatric patients with primary generalized seizures (78%) were observed than with partial seizures (22%). In this age group, the most frequent seizure type was generalized tonic clonic (36%) with the peak frequency of age at onset of seizures in 2-5 years.

Key words: Epilepsy, Frequency, Age at onset.

Epilepsy is a common childhood neurological disorder throughout the world. It is estimated[1] that between 72 and 86 in every 100,000 children under 9 years and between 46 and 83 in every 100,000 children under 14 years suffer from epilepsy. In the United States[2] over 4% of white middle class populations can be expected to have seizure by age 20 and persons living in socioeconomically deprived areas are twice as likely to have a convulsive disorder. This may be because malnutrition may lower seizure threshold[3] by its effect on inhibitory neurotransmitters and electrolytes. The onset of seizures occurs in about one third of all new patients during the first 20 years of life[1, 17]. Beside others, the age at onset and seizure types characterize various epileptic syndromes[12] whose descriptive classification[4] is extremely useful clinically.

There is a dearth of literature on epilepsy in Nepalese population and published data on incidence of categories of seizure types or relative frequencies of various types of epilepsy or their age at onset in Nepalese children is virtually nonexistent.

The present study was done with the following prime objectives:

(i) To analyze the relative frequencies of various epileptic seizures and

(ii) To study the age at onset of different seizure types in Nepalese children.

Materials and methods

Kathmandu Medical College and Teaching Hospital, Sinamangal serves a catchment population from all the districts of Nepal in general and the Kathmandu valley in particular. All patients presenting to the paediatric outpatient for a period of one year from November 2001 to October 2002 were enrolled in the study under the following criteria:

History of two or more unprovoked seizures excluding neonatal and febrile seizures.

Diagnosis of epilepsy was made from the history including clinical description of the epileptic event, neurological examination supplemented with electroencephalogram (EEG) recordings in all cases and brain computed tomography (CT) in some cases. Age at the time of the first seizure was recorded and classification of epilepsy was done according to the International Classification of Epilepsy of the International League Against

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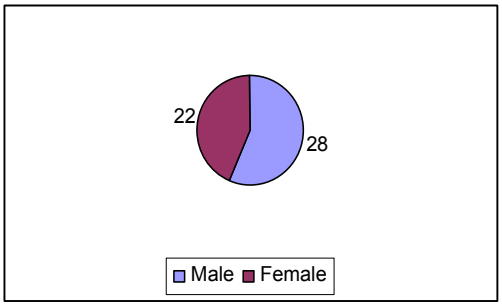
Epilepsy (ILAE)[5] Analysis was done to deduce the relative frequencies of all observed seizure types and to delineate their age at onset.

Results

A total of 50 consecutive new cases of epilepsy were enrolled in the study of which 28 were male and 22 female (Figure 1)
M: F ratio = 1:0.78

Figure 1 Patient details

Male	Female	Total
28	22	50



Relative frequencies of seizure types
The relative frequencies of different types of seizures recorded are given in Table 1. Partial seizure was observed in 22% cases and generalized seizure (78%) was found 3.54 times commoner than it. The commonest partial seizure recorded was complex partial type (14%) while simple partial and partial with secondary generalization had equal frequencies (4% each). The most frequent seizure type in the whole series was generalized tonic clonic (36%) and other generalized seizures in order of frequency were tonic (16%), atonic (12%), absence (10%) and clonic (4%).

Table 1 Relative frequency of seizures in the study patients

Seizure type	**'n'**	**% of Total**
Partial seizures	11	22
Simple Partial	2	4
Complex Partial	7	14
Partial with Secondary generalization	2	4
Generalized seizures	39	78
Absences	5	10
Typical	1	2
Atypical	4	8
Generalized tonic-clonic	18	36
Generalized tonic	8	16
Generalized clonic	2	4
Generalized atonic	6	12
Total	50	100

Age at onset of various seizure types
The first seizure occurred when aged between 1 month and 1 year for 16%, between 2-5 years for 40%, between 6 and 10 years for 32% and between 11 and 15 years for 12%. The age at onset of seizures (relative frequencies) is shown in Figure 2. The most vulnerable age for the onset of seizure ranged between 2-5 years.

Figure 2 Relative frequencies of age at onset of Seizures

Age group in years	'n'
1/12 – 1	8
2 – 5	20
6 – 10	16
11 - 15	12
Total	**46**

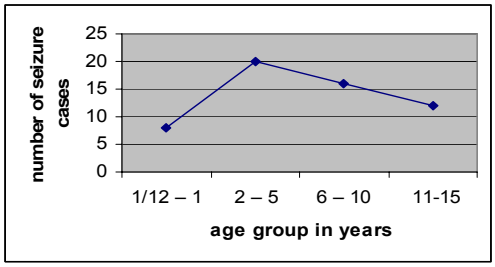


Figure 3 Age at onset of major seizure categories

Age group in years	No of Cases of	
	Partial Seizures	Generalized seizures
1/12 - 1	2	6
2 – 5	6	14
6 – 10	2	14
11 – 15	1	5
1/12 - 15	11	39

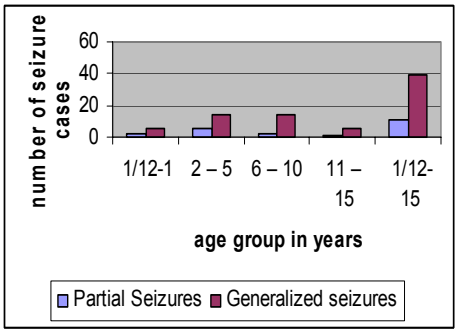


Figure 3 shows the age at onset of major seizure categories. In partial onset seizures the peak age was under 6 years and in primarily generalized seizures plateau was seen between ages 2-10. The distribution of age at onset for different seizure types is given in Table 2. Unlike simple partial, the complex partial and partial with secondary generalization seizures frequently had their onset at ages 2-5. The generalized tonic clonic and the atypical absence seizures on the other hand, had comparatively wider range of peak age at onset (2-10 years).

Table 2 Distribution of age at onset for different seizure types (Figures are percentages of the total) ('n'=50)

Seizure Type	Age group in years				
	1/12 - 1	2 –5	6 – 10	11 – 15	1/12 - 15
Partial Seizures	4	12	4	2	22
Simple Partial	2	-	2	-	4
Complex Partial	2	10	2	-	14
Partial with Secondary Generalization	-	2	-	2	4
Generalized Seizures	12	28	28	10	78
Absences	-	4	6	-	10
Typical	-	-	2	-	2
Atypical	-	4	4	-	8
Generalized tonic – clonic	6	14	12	4	36
Generalized tonic	6	4	6	-	16
Generalized clonic	-	-	2	2	4
Generalized atonic	-	6	2	4	12
Total	16	40	32	12	100

Discussion

Epilepsy, being a common disabling illness with a worldwide prevalence in the range of 0.5 to 0.9% as assessed by studies in Europe, North and South America, Asia and Africa[6] is an important paediatric problem in Nepal. The present case series despite appearing small, retains the reflections of basic pattern of age group and seizure type distribution. In this the diagnosis of epilepsy with emphasis on its feature "as recurrent seizures unrelated to fever or to an acute cerebral insult"[7] appropriately formed the basis for case selection. Learning from Dr. Andrew Holton's experience[8], care was taken for not falling into 'common pitfalls in the management of epilepsy'[9,10,11]. In this series the analysis of sex distribution of the cases showed male preponderance, which has already been documented[12].

Relative frequencies of seizure types

Generalized seizure was found three and a half times as common as partial seizure. This is in keeping with its description as '…. the commonest broad type of epilepsy in 2-12 years age group'[12]. Less than a quarter (22%) of the total was partial seizure although Cavazzutti, 1980[13] accounted it for upto 40% of childhood seizures. However, in the prevalence studies in Saudi nationals[14] partial seizure-28%, generalized seizure-21% and undertermined-51%, in Sicilian municipalities[15] partial- 23%, generalized-74% and undetermined-3%, and in German children[16] focal epilepsy or epileptic syndrome-58%, generalized-39% and undertermined-3% were reported. In the present series generalized tonic clonic was the commonest seizure type found with the highest overall incidence (36%), which is higher than its incidence (6.6%) observed in a cohort study of 440 consecutive patients done at Tel Aviv, Israel[17] in which the most frequent seizure type was partial with secondary generalization (20.7%). However, 32.9% seizures were of generalized tonic clonic type in another study entitled 'Epilepsy in children with cerebral palsy'[18]. No case of myoclonic seizure was diagnosed in the present series although it has been described[19] to account for upto 7% of the epilepsies which have an onset during the first 3 years of life.' Of the absence seizure, atypical (8%) was found more commonly than typical (2%) in the present study whereas the reverse (atypical-0.6% and typical-7%) was reported by others[17]. This variance may be because of problems due to reliance on EEG for diagnosis of typical absence seizure, which may alter the incidence and prevalence figures to a significant extent[20]. The complex partial seizures, which may account for upto a quarter of childhood epilepsy[12] has been representative of 14% of the total member of seizure cases in the present series.

Age at onset of different seizure types

Table 3 (The relative frequencies of age at first seizure) compares results from present series with figures from a 20 years' retrospective study[17]. The frequencies in all age groups are highly comparable in the two series and the peak frequency of seizures seen in the age range of 2-5 years in the present series (Figure 2) is also observed in the compared series. Unlike partial seizure which was more frequently observed in the under 5s, the generalized seizure showed a plateau of frequency throughout mid-childhood (2-10 years). In the ages between 2-5 years complex partial and generalized tonic clonic seizures had their onset more commonly but in the ensuing 5 years (i.e. between ages 5-10) increased frequency of onset only of generalized tonic clonic seizure was persistently observed. Because partial seizure is difficult to document in infants and children[7] the frequency of its association with complex partial seizure may have been underestimated. The generalized tonic clonic

seizure, on the other hand because of its florid clinical symptomatology is hardly ever underdiagnosed. The absence seizures had their age of onset clustered between ages 2-10 and none was seen above or below this age range. However, childhood absence epilepsy represented 8% in school-age epileptic children in one study[13].

Table 3 Relative frequencies of age at first seizure

Age group in years	Kathmandu [1]	Tel Aviv [2]
1/12 – 1	16%	18%
2 – 5	40%	33%
6 – 10	32%	31%
11 – 15	12%	18%
1/12 - 15	100%	100%

1 – Present study at KMCTH, 2002 ('n'=50)
2 – Kramer U, Nevo Y, Neufeld MY et al, 1998 ('n'=440)

Conclusion

Primary generalized seizures (78%) were observed to be 3.54 times as common as partial seizures (22%). Generalized tonic clonic was the most frequent type seen in 36% of whole series. Seizures were found to have peak frequency of age at onset in 2-5 years children.

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Humbling Thoughts

It has been more than two decades since Dr. Kelly M. West of the University of Oklahoma Medical Center* published his now classic criticism of medical education. His statements easily could be broadened to include all health science curricula, and should be permanently affixed to the working chalkboard of every conference room in which school of medical curriculum committees deliberate. These statements, slightly paraphrased, are:

1. Only a small portion of the current body of knowledge can be taught in the prescribed period of time.
2. Much of that knowledge that will be employed in the student's future career is not known today and, therefore cannot be taught.
3. Not all that is taught is learned.
4. A small part of what is taught is erroneous.
5. A portion of what is learned will soon be obsolete.
6. Of that which is taught and learned and relevant, much is quickly forgotten.

Attempts to teach students all that they will need to know for the future are futile. The challenge is to carefully select experiences that help students learn to solve problem, emphasizing only those facts and principles that are most basic and broadly relevant. In this way the current educational program can prepare doctors able to meet future demands.

*West, K. M. (1996). The case against teaching. *Journal of Medical Education, 41, 766-771*

If I were founding a university I would found first a smoking room; then when I had a little more money in hand I would found a dormitory; then after that, or more probably with it, a decent reading room and a library. After that, if I still had more money that I couldn't use, I would hire a professor and get some textbooks.

Stephen Leacock*

Quoted from "Oxford as I see it". Harpers, 144;738-745, May, 1922.