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Etiological Profile of Children Presenting with First-Onset Seizures: A Prospective Study.

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ABSTRACT

Background: Seizures can be defined as transient alteration in consciousness which generally manifests as specific behavioral and motor activity. Seizures are one of the common causes of admissions to pediatric intensive care units. Though seizures can start at any age and no age is an exemption to the onset of seizures, it usually occurs in early childhood or late adulthood. We undertook this prospective study to analyze clinical presentation and etiological profile of children presenting with first onset seizures before 12 years of age. **Methods:** This was a prospective study in which children between the age group of 1-12 years and presenting with new onset seizures were included on the basis of a predefined inclusion and exclusion criteria. Detailed history was taken and through clinical examination was done in all the cases. Routine investigations such as complete blood count, serum electrolytes and random blood sugar was done in all the cases. Neuroimaging was done in selected cases. SSPS 21.0 software was used for statistical analysis. **Results:** Out of 60 cases there were 34 boys (56.67%) and 26 girls (43.33%) with a M:F ratio of 1:0.76. Most common affected age group was less than 5 years of age (40%) followed by 5-8 years (35%) and 9-12 years (25%). Most common type of seizures seen in studied cases were generalized tonic clonic seizures which were seen in 45 (75%) cases followed by generalized tonic seizures which were seen in 10 (16.67%) cases. After convulsions lethargy was found to be the most common accompanying clinical feature in studied cases which was seen in 27 (45%) patients. most common cause of convulsions in the studied cases was febrile seizures which was seen in 22 (36.67%) patients followed by pyogenic meningitis (20%) and cerebral palsy (11.67%). EEG and Neuroimaging abnormalities were seen in 12 (20) and 14 (25%) patients respectively. **Conclusion:** Seizures are one of the common emergencies faced by pediatricians. Its correct etiological diagnosis is important from the point of view of proper management.

Keywords: Seizures, Children, Febrile seizures, Neuroimaging.

INTRODUCTION

Seizures in the children are one of the common causes of pediatric consultations. Seizures can be defined as transient alteration in consciousness which generally manifests as specific behavioral and motor activity.[1] The cause of this motor activity is electrical discharge from a group of neurons from cerebral cortex. This electrical activity may have varied manifestations ranging from frightening convulsions to hardly noticeable motor movements.[2] The incidence of seizures is reported to be up to 1% in general population. Though seizures can start at any age and no age is an exemption to the onset of seizures, it usually occurs in early childhood or late adulthood. The causes of seizures can be broadly divided into 2 groups provoked and unprovoked seizures.[3]

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Provoked seizures are due to the abnormalities such as electrolyte imbalance, hypoglycemia, central nervous system infections, drugs, injury, intracranial hemorrhage or mass lesions whereas unprovoked seizures by definition occur in absence of any provocative causes.[4] The most common causes of seizures in children include febrile convulsions, birth asphyxia and cerebral palsy, CNS infections and epilepsy. Irrespective of the underlying mechanism or cause of seizures it remains one of the most frightening experience for parents who invariably get terrified the child convulsing.[5]

The diagnosis of seizures is usually clinical but determining its etiology requires investigations. Investigations are also important from the point of view of excluding organic causes of seizures which may need specific interventions. It would be hazardous to miss the etiological diagnosis of provoked seizures such as seizures occurring secondary to pyogenic or even tuberculous meningitis.[6] Electroencephalography is one of the primary investigations for the diagnosis of epilepsy but it's important to understand that interictal EEG may be normal and hence in suspected cases video

monitored EEG is required. EEG is also important in cases where the patients are labelled to be having pseudo seizures until the time proper diagnosis is made with the help of video EEG. Apart from EEG proper history given by a reliable caretaker is one of the most important factors to arrive at a diagnosis.[7]
The role of neuroimaging in pediatric age group is a matter of intense debate and many authors recommend that neuroimaging must be done in all patients presenting with any type of seizures while the others recommend neuroimaging only in patients who had seizures and not found to have idiopathic epilepsy.[8] The justification for withholding neuroimaging in all patients appears to be low incidence of lesions which may need acute intervention in children presenting with first episode of seizures. Neuroimaging must be done in patients presenting with atypical febrile seizures, focal seizures and intractable seizures not responding to usual antiepileptic drugs. Of course, provoked seizures may need other investigations such as CSF analysis serum electrolytes, random blood sugar and blood counts apart from neuroimaging, depending upon the suspected diagnosis. Management of patients presenting with seizures depend upon the etiology and may include antiepileptic drugs in addition to specific management of etiology.[9]
We conducted this prospective study to know the etiological profile of pediatric patients between the age group of 1-12 years.

MATERIALS AND METHODS

The study was conducted in the department of pediatrics of a tertiary care private hospital having its own pediatric and neonatal intensive care units. Informed written consent was obtained from the caregivers or parents of the cases. 60 Pediatric patients between the age group of 1-12 years either presenting with seizures or developing seizures during the course of hospital stay were included in this study on the basis of a predefined inclusion and exclusion criteria. The children below 1 year of age were excluded from this study because of the reason that causes of seizures in this age group are different. A detailed history was obtained from the parents or care givers, history of seizures in past or family members was specifically asked and noted down. A through clinical examination was done in all the cases particularly to exclude the presence of provoking cause of seizures. Routine investigations such as complete blood count, random blood sugar, serum electrolytes, renal function tests and hepatic function tests and electroencephalogram was done in all the cases. Neuroimaging and CSF analysis, if required, was done in selected patients. Primary neuroimaging modality used was non contrast enhanced computerized tomography scan of brain. If indicated magnetic resonance imaging or contrast enhance CT was done. For statistical purpose SSPS 21.0 version was used.

Inclusion Criteria:

1. Children between 1-12 years of age and presenting with seizures or getting seizures during the course of hospital stay.
2. Parents/Guardians gave informed written consent to be part of study.

Exclusion Criteria:

1. Parents/Guardians Refused consent.
2. Children less than 1 year.
3. Age more than 12 years.
4. Patients with Non-epileptic paroxysmal events mimicking seizures.

RESULTS

60 children between the age group of 1-12 years were included in this study on the basis of a predefined inclusion and exclusion criteria. Out of 60 cases there were 34 boys (56.67%) and 26 girls (43.33%) with a M:F ratio of 1:0.76.

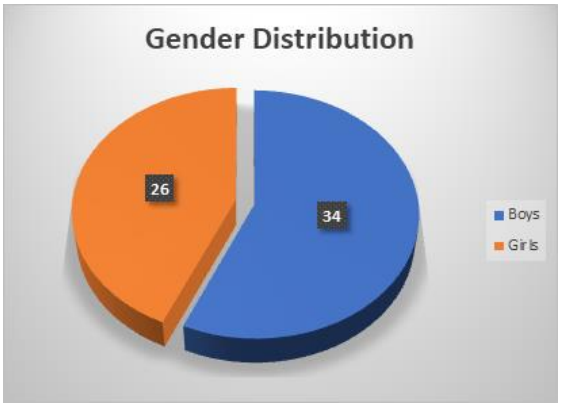

Figure 1: Gender Distribution of the studied cases.

The analysis of the age group of the studied cases showed that the most common affected age group was less than 5 years of age (40%) followed by 5-8 years (35%) and 9-12 years (25%). The mean age of the affected cases was found to be 6.72 +/- 3.12 years.

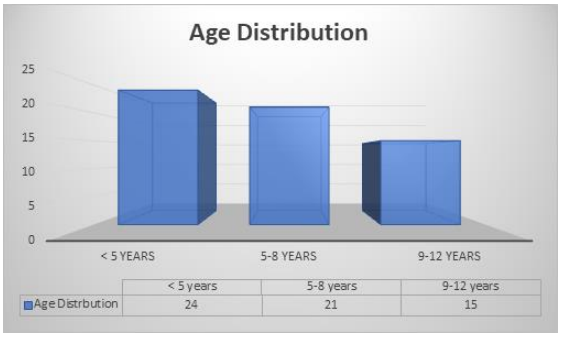

Figure 2: Age Distribution of the affected cases.

The analysis of type of seizures showed that the most common type of seizures seen in studied cases were generalized tonic clonic seizures which were

seen in 45 (75%) cases followed by generalized tonic seizures which were seen in 10 (16.67%) cases.

Least common type of seizures were partial seizures which were seen in 5 (8.33%) patients.

Table 1: Gender-wise distribution of type of seizures in studied cases.

Sex		Type of seizures			Total
		Generalized Tonic Clonic	Generalized Tonic	Partial	
Female	No.	18	6	2	26
	%	30 %	10 %	3.33%	43.33%
Male	No.	27	4	3	34
	%	45 %	6.67 %	5%	56.67%
Total	No.	45	10	5	60
	%	75 %	16.67 %	8.33 %	100.0%

The analysis of presenting features of the studied cases showed that seizure being inclusion criteria was present in all the cases. Altered sensorium at the time of admission or during course of hospital stay was seen in 12 (20%) patients. After convulsions lethargy was found to be the most common accompanying clinical feature in studied cases which was seen in 27 (45%) patients. The other common clinical features included fever (36.67%) and cough (26.67%) or cold (26.67%).

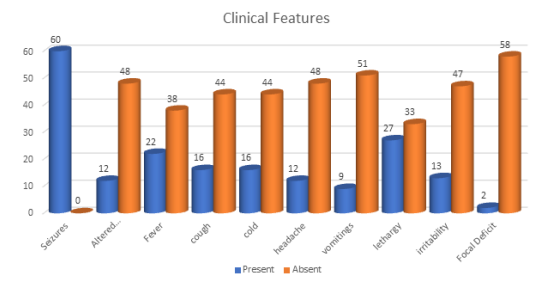

Figure 3: Clinical Features in the studied cases.

The analysis of etiological classification of the studied cases showed that the most common cause of convulsions in the studied cases was febrile seizures which was seen in 22 (36.67%) patients followed by pyogenic meningitis (20%) and cerebral palsy (11.67%). In 6 (10%) patients no definite cause of seizures could be determined.

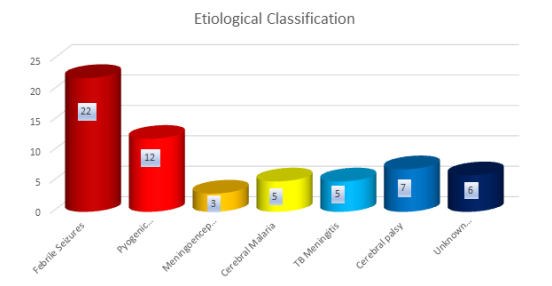

Figure 4: Etiological Profile of the studied cases.

The analysis of EEG findings in the studied cases showed that EEG was abnormal in 12 (20%) cases. The most common abnormality on EEG was found to be sharp waves which were seen in 5 (8.3%) patients followed by spike waves (5%) and asymmetry with sharp waves (3.33%). Sharp and spike waves were seen in 2 (3.33%) patients.

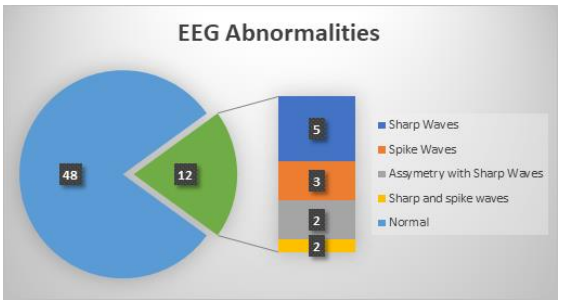

Figure 5: EEG abnormalities in studied cases.

Neuroimaging was done in 38 patients. Out of 38 patients in whom neuroimaging was done 18 patients had neuroimaging abnormalities. The most common type of neuroimaging abnormality was found to be cerebral edema which was seen in 9 patients. Hydrocephalus was seen in 4 patients. Whereas cerebral atrophy was reported in 3 patients. Infarct was seen in 1 patient on neuroimaging.

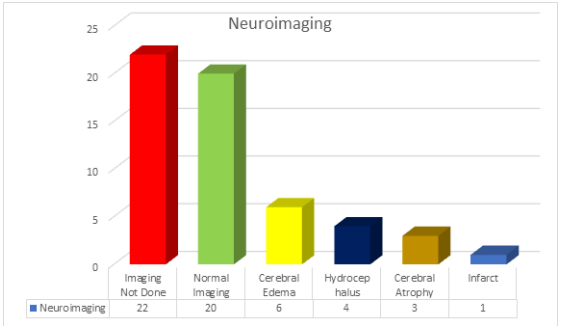

Figure 6: Neuroimaging abnormalities in studied cases.

DISCUSSION

We conducted this prospective study to analyze clinical features and etiological profile of children between 1-12 years of age presenting with first onset seizures. We prospectively studied 60 patients in this study who either presented to us with seizures or had an episode of seizure during hospital stay.

In our study there was a male predominance with a M:F ratio being 1:0.76. Similar male preponderance in the patients admitted for newly onset seizures have been reported by many authors. Dwivedi R et al conducted a prospective study at a tertiary care center in which authors analyzed 98 children aged 3-12 years presenting with new onset seizures. The

authors studied 98 children out of which 51 were 3-5 yrs of age and 47 were 6-12 years. 66.3% had generalized seizure and 33.6% had partial seizure. Partial seizure was more common in 5-12 years of age. There was significantly high incidence of focal EEG changes in partial seizure group compared to generalized seizure group. The M:F ratio of cases in this study was reported to be 1.04:1.[10] The other studies such as those conducted by Mwipopo EE et al,[11] (M:F; 109:91) and Alakkodan D et al,[12] (112:106) also reported male preponderance amongst children presenting with first onset seizures. The most common age group affected in our study was found to be less than 5 years of age. The mean age of the studied cases was found to be 6.72 +/- 3.12 years. In a study conducted by Selvan T et al the authors found that prevalence of status epilepticus among children admitted was 8.7%. Most common age was found to be 1-3 years (54.5%). Preponderance of male (51.5%) over female (48.5%) was observed. The two most common etiology observed was Atypical febrile seizures (33.3%) and meningitis (22.7%). 57.5% children presented as first episode of seizure and duration of seizure was less than 2 hours in 65.1%. The mortality and morbidity in the form of neurodeficits were observed between the age group of 1 month to 3 years. Based on the duration of seizure lasting more than 8 hours, two third had mortality and one third had morbidity. The age group affected as reported in this study was similar to the mean age of the studied cases in our study.[13]

In our study the most common cause of seizures was found to be febrile convulsions followed by pyogenic meningitis and cerebral palsy. Similar findings were reported by the author such as Chen CY et al.[14] In this study out of 319 studied cases, 218 (68%) presented with seizures and fever and 299 (94%) children were younger than 6 years of age. Generalized tonic-clonic seizures were the most common type (71.2%). Febrile seizures (62.1%) were the main etiology of the first seizure ($p < 0.001$). Seizures caused by severe electrolyte imbalance or hypoglycemia were noted in three patients. Abnormal brain images were noted in 16 (26%) of 61 patients, most (12/16, 75%) of whom had abnormal histories and physical or neurologic examinations. Similar findings were reported by the authors such as Leung AK et al.[15]

CONCLUSION

Seizures are one of the common presenting complaints for which pediatrics consultation are sought. Its proper etiological diagnosis is important from the point f view of management. In our study febrile convulsions were found to be the most common cause of seizures in children presenting with first onset seizures below the age of 12 years.

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