Evaluation of Seizure Semiology and EEG Findings in Neurologically Normal Children with First Unprovoked Seizure

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Background: Seizures are a very common neurologic condition among the pediatric population. Unprovoked seizures in children can be classified into two types: generalized and partial. Electroencephalogram (EEG) is an essential investigation in children who have experienced their first unprovoked seizures.

Objective: To evaluate common seizure semiology and electroencephalogram (EEG) findings in neurologically normal children who presented with their first unprovoked seizure.

Settings: Bahrain Defence Force Hospital, Bahrain.

Design: A Retrospective Study.

Methods: One hundred nine patients, 3–14 years of age, who presented with their first unprovoked seizure from January 2017 to January 2018 were included in the study. Patients' clinical information and EEG results were obtained by using a computerized database.

Results: Seventy-three (67%) patients presented with generalized seizure and thirty-six (33%) patients presented with partial seizures. Abnormal EEG was found in forty-eight (44%) patients.

Conclusions: Generalized seizure was the most common seizure presentation in neurologically normal children who presented with first unprovoked seizure. Nearly half of these patients exhibited abnormal EEG findings.

Seizure in children is considered to be the most common neurological disorder[1,2]. Unprovoked seizures in children can occur in the absence of immediate risk factors, such as head trauma, fever, or electrolyte imbalance[3,4]. Unprovoked seizures are classified into generalized and partial seizures based on clinical features[5]. Electroencephalogram (EEG) is an important neurodiagnostic study in the initial assessment of children who present with their first unprovoked seizures[6].

The aim of this study is to evaluate the most common seizure semiology in neurologically normal children who presented with their first unprovoked seizures and to evaluate the associated EEG findings.

METHOD

One-hundred nine patients, 3–14 years of age presented with their first unprovoked seizure from January 2017 to January 2018 were include in the study. EEG studies were performed on all patients. Inclusion criteria were as follows: age between 3-14 years, the presence of first unprovoked seizure and neurologically normal children. Exclusion criteria were as follows: children with provoked seizures, and developmentally delayed children. Fourteen patients were excluded: eight had provoked seizures, seven had fever, and one had hypoglycemia at the time of their initial presentation; six patients were developmentally delayed. Clinical presentation and EEG results were obtained by using a computerized database. The data was compiled on Microsoft Excel and analyzed using the SPSS version 6 software. All relevant data were analyzed.

RESULTS

One-hundred-nine patients aged 3–14 years with normal neurological examination presented with first unprovoked seizure were reviewed from January 2017 to January 2018.

The median age was 6 years. Sixty (55%) patients were males and forty-nine (45%) patients were females. Seventy-three (67%) patients presented with a generalized seizure. Thirty-six (33%) patients presented with focal seizure, see table 1 and figure 1.

Abnormal EEG was found in forty-eight (44%) patients; thirty-four (31%) patients had focal epileptiform abnormalities, twelve (11%) patients had generalized epileptiform discharges and two (2%) patients had slow EEG activity, see table 2 and figure 2.

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Table 1: Personal Data and Evaluation of Seizure Semiology

	Number of Patients	Percentage
Number of Patients		
Male	60	55%
Female	49	45%
Total	109	100%
Average Age	years 6	-
Seizure Semiology		
Generalized Seizure	73	67%
Focal Seizure	36	33%
Total	109	100%

Table 2: EEG Result and Type of Abnormality

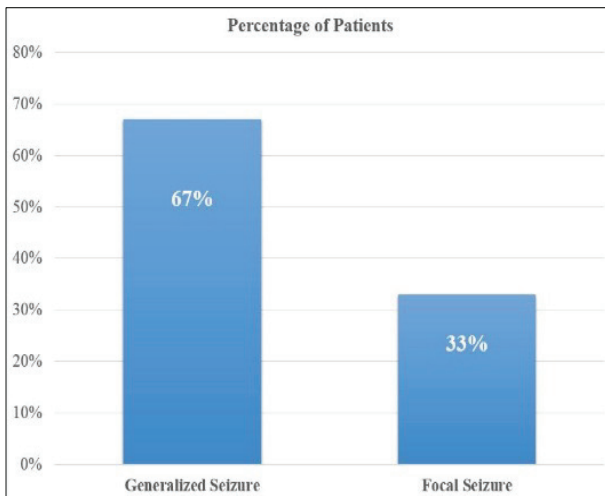|	Number of Patients	Percentage
EEG Results		
Normal EEG Study	61	56%
Abnormal EEG Study	48	44%
Total	109	100%
EEG Abnormalities		
Focal Epileptiform Discharges	34	31%
Generalized Epileptiform Discharges	12	11%
Slow Activity	2	2%

Figure 1: The Most Common Seizure Semiology in Patients with the First Episode of Unprovoked Seizure was Generalized Convulsion

DISCUSSION

A seizure is the most frequent central nervous system disorder seen in pediatric patients[1,2]. Unprovoked seizures are defined as seizures that occur in the absence of precipitating factors[3,4]. Unprovoked seizures in pediatric population can be classified into generalized and partial seizures[5]. Almost half of the children who presented with their first unprovoked seizure were found to have abnormal EEG results[8].
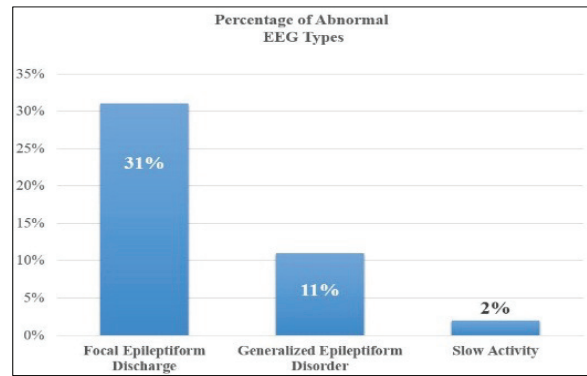

Figure 2: Focal Epileptiform Discharges is the Commonest Type of EEG Abnormalities

In our study, the most common clinical features (67%) associated with first unprovoked seizure was generalized seizures; 33% had focal onset seizures at their initial clinical presentation. Poudel et al reported that the majority of children (79.2%) had an unprovoked seizure and presented with generalized onset, which is similar to our findings[7].

In the present study, 44% exhibited abnormal EEG data; this is consistent with Shinnar et al, where 42% of children who presented with first unprovoked seizure had abnormal EEG findings[8].

The primary abnormal EEG findings in our study constituted focal epileptiform discharges (31%); only 11% of children exhibited generalized epileptiform discharges and 2% showed slow activity; these findings are similar to those of Kim et al, where focal epileptiform discharges were the major type of abnormal EEG findings[9].

In our study, nearly half of our patients had abnormal EEG findings in their first episode of unprovoked seizure, which suggests that EEG studies should be recommended for all children who present with unprovoked seizures; according to Dusitanond, EEG study should be obtained in all points with first unprovoked seizure[10].

The study is limited by the retrospective nature, which has its own limitations and the relatively small sample size. Although the sample was small, our final result showed that 67% of patients presented with a generalized seizure at the first unprovoked seizure. Forty-four percent of patients had abnormal EEG at the first unprovoked seizure.

The impact of our study could be that preschool and school-age children with normal developmental milestones commonly present with generalized onset seizures at their first presentation of unprovoked seizures in our region and should have a baseline EEG study as a part of their initial assessment.

CONCLUSION

Generalized seizure is the most common seizure semiology in children with normal development milestones who have experienced their first unprovoked seizure. Nearly half of the children who presented with their first episode of unprovoked seizure exhibited abnormal EEG findings,

which indicates the importance of EEG as an initial neurodiagnostic baseline study in such children.

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