

A Retrospective Study of Clinico-Etiological Profile of Focal Seizures in Children

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ABSTRACT

Background: Focal seizures are a common subtype of epilepsy in children, particularly in developing countries where infections are endemic. Understanding their clinical presentation and etiology is essential for effective diagnosis and treatment.

Objectives: To evaluate the clinical features and etiological spectrum of focal seizures in children aged 1–12 years at a tertiary care center.

Methods: This retrospective observational study included 45 children with focal or focal to bilateral seizures who presented between January 2018 and December 2019.

Demographic data, seizure semiology, EEG, neuroimaging, and etiological factors were analyzed using SPSS software.

Results: The mean age at presentation was 6.88 ± 3.40 years, with a slight female predominance (57.78%). Focal seizures with impaired awareness (62.22%) and motor onset (80%) were most common. EEG was abnormal in 66.3% of cases, while neuroimaging revealed abnormalities in 68.89%, predominantly ringenhancing lesions (44.45%). Infective granulomas, including neurocysticercosis and tuberculomas, accounted for 44.44% of cases. Structural, metabolic, genetic, and idiopathic causes contributed to the rest.

Conclusion: Focal seizures in children are most frequently associated with infectious etiologies, especially neurocysticercosis. EEG and neuroimaging are invaluable in diagnosis and etiological classification. Early detection and targeted therapy are vital in reducing morbidity and preventing chronic epilepsy.

Keywords: Focal seizures, epilepsy, children, neurocysticercosis, EEG, neuroimaging, tuberculoma, ILAE classification

1. INTRODUCTION

A seizure is a paroxysmal alteration of neurological function caused by excessive, hypersynchronous neuronal discharge. Epilepsy, a condition of recurrent unprovoked seizures, is the most common pediatric neurological disorder. It is estimated that up to 10% of children experience at least one seizure, with the highest incidence below 3 years of age [1]. Approximately

150,000 children sustain a first-time unprovoked seizure annually, and 30,000 develop epilepsy [2].

Epilepsy prevalence varies globally between 3 and 22.2 per 1000 population. In India, recent data show prevalence ranging from 4.9 to 7.5 per 1000 and an average national rate of 6.24/1000 [3].

The 2017 ILAE classification classifies seizures based on origin (focal, generalized, or unknown), awareness, and motor/non-motor onset [4]. Paediatric focal seizures are frequently due to perinatal insults, cortical malformations, neuroinfections (NCC, tuberculoma), trauma, or metabolic causes [5,6].

Given the importance of identifying etiology and clinical patterns for optimal management, this study was conducted to assess the clinical and etiological profile of focal seizures in children.

2. MATERIALS AND METHODS:

This retrospective observational study was conducted at a tertiary care public hospital. Records of children aged 1–12 years presenting to the epilepsy OPD or admitted with focal seizures between January 2018 and December 2019 were reviewed. Data analysis was conducted using Windows SSPE software after institutional ethical clearance.

Inclusion Criteria:

- 1.Age 1–12 years.
- 2.Clinical semiology of focal or focal to bilateral seizures.

Exclusion Criteria:

- 1.Generalized seizures.
- 2.Incomplete medical records.

Sample size: 45 children

3. RESULT

Table 1: Demographic Characteristics

Parameter	Value
Mean age (years)	6.88 ± 3.40
Female	26 (57.78%)
Male	19 (42.22%)

Inference: The mean age of seizure onset was approximately 6.88 years, with a slight female predominance.

Table 2: Seizure Characteristics

Characteristic	Value
>5 episodes before visit	21 (46.67%)
Right-sided seizures	24 (53.34%)
Focal seizures	39 (86.67%)

Focal to bilateral tonic-clonic	6 (13.33%)
Focal aware	17 (37.78%)
Focal impaired awareness	28 (62.22%)
Aura present	9 (20%)
Motor onset	36 (80%)
Non-motor onset	9 (20%)

Inference: Focal impaired awareness seizures were predominant, with motor onset being more common.

Table 3: Motor & Non-Motor Onset Types

Type	Frequency (%)
Clonic	22 (48.88%)
Tonic	8 (17.78%)
Hyperkinetic	2 (4.45%)
Epileptic Spasm	1 (2.22%)
Myoclonic	2 (4.45%)
Automatism	1 (2.22%)
Sensory	8
Behavioural	1
Cognitive	2
Emotional	1
Autonomic	1

Inference: Clonic seizures were the most common motor type; sensory symptoms dominated the non-motor group.

Table 4: EEG and Imaging Findings

Parameter	Frequency (%)
EEG - Normal	17

EEG - Generalized discharges	13
EEG - Focal discharges	15
Ring-enhancing lesions	20 (44.45%)
Cortical atrophy	3 (6.67%)
Gliosis	3 (6.67%)
MTS, cortical dysplasia, others	1 each (2.22%)
Normal imaging (NAD)	14 (31.11%)

Inference: EEG was abnormal in two-thirds of cases; imaging revealed ringenhancing lesions in nearly half the patients

Table 5: Etiological Classification

Etiology	Frequency (%)
Infective granuloma (NCC/tuberculoma)	20 (44.44%)
Structural (HIE, dysplasia, trauma)	9 (20%)
Metabolic	3 (6.66%)
Genetic/Epileptic syndromes	4 (8.88%)
Idiopathic	8 (17.77%)

Inference: Infective causes, especially neurocysticercosis and tuberculoma, were the most prevalent.

4. DISCUSSION

The study comprehensively examined the clinico-etiological profile of focal seizures in children. The mean age of onset was 5.58 years, with most children presenting between 5 to 10 years. A slight female predominance was noted. A significant number of children had a history of more than five seizure episodes before seeking tertiary care, indicating delayed healthcare access or misdiagnosis at the primary level.

Most children presented with focal seizures, of which impaired awareness seizures were more frequent. The high prevalence of motor onset seizures, especially clonic types, aligns with findings from earlier Indian studies [7,8]. Aura was reported in 20% of children, suggesting cortical localization of the seizure onset zone.

Neuroimaging and EEG proved to be essential tools in identifying seizure foci. While EEG abnormalities were present in two-thirds of the cases, neuroimaging revealed significant abnormalities in nearly 70% of cases. The predominance of ring-enhancing lesions (44.45%) strongly suggests infections such as neurocysticercosis and tuberculomas as primary causes in endemic regions [10,11]. This supports the hypothesis that infectious etiologies still dominate the epilepsy landscape in developing countries.

Structural abnormalities like cortical dysplasia, gliosis, and mesial temporal sclerosis were less frequent but clinically significant, as they often suggest pharmacoresistance and the potential need for surgical evaluation. The presence of epileptic syndromes and metabolic causes further emphasizes the need for comprehensive etiological assessment in pediatric seizure cases.

The findings reiterate the utility of ILAE 2017 classification in improving the clinical categorization of focal seizures. Moreover, the study reinforces the importance of early imaging and EEG, particularly in resource-limited settings where infections remain prevalent.

Limitations of this study include its retrospective nature, small sample size, and dependence on hospital records. Nevertheless, it provides a strong basis for larger prospective studies and community-level interventions.

5. CONCLUSION

This study highlights the following key points:

- Focal seizures with impaired awareness are the most common type among children aged 1–12 years.
- Infectious etiologies—particularly neurocysticercosis and tuberculomas— remain the leading causes of focal seizures in India.
- Neuroimaging and EEG are indispensable in identifying the seizure etiology and guiding treatment.
- Early detection and proper classification can significantly improve outcomes and reduce the burden of epilepsy.
- Public health initiatives aimed at controlling CNS infections could drastically reduce epilepsy incidence in children.

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