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Original Research Article

Clinical Profile of Seizures in Patients Aged 1 Month to 12 Years Admitted in a Tertiary Care Centre

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Abstract

Background: Seizures are one of the most common neurological emergencies in the pediatric age group and represent a frequent cause of hospital admission. The etiological spectrum of seizures in children varies widely depending on age, underlying neurological conditions, infections, metabolic disorders, and genetic predisposition. Early identification of the cause and clinical pattern is essential for prompt treatment and prevention of long-term neurological complications.

Aim: To study the clinical profile, etiological factors, and patterns of seizures in children aged 1 month to 12 years admitted to a tertiary care centre.

Materials and Methods: This hospital-based observational study was conducted at the Department of Pediatrics, Tripura Medical College and Dr. BRAM Teaching Hospital, Hapania, Agartala, Tripura, India. A total of 250 children aged between 1 month and 12 years admitted with seizures were included. Detailed history, clinical examination, and appropriate investigations such as blood tests, neuroimaging, and electroencephalography (EEG) were performed. Data regarding demographic profile, seizure type, etiological factors, associated clinical features, and outcomes were recorded and analyzed.

Results: Among the 250 children included in the study, the majority were below 5 years of age with a male predominance. Generalized tonic-clonic seizures were the most common seizure type. Febrile seizures and central nervous system infections were the leading etiological causes. Neuroimaging abnormalities were detected in a significant proportion of cases.

Conclusion: Seizures are a common pediatric neurological emergency, particularly in younger children. Early diagnosis of underlying causes such as febrile illness and CNS infections is essential to reduce morbidity and improve clinical outcomes.

Keywords: Seizures; Pediatric epilepsy; febrile seizures; CNS infections; Electroencephalography; Children.

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Introduction

Seizures are one of the most frequent neurological disorders encountered in childhood and represent a major cause of hospital admissions in pediatric emergency departments worldwide. They are defined as sudden, excessive, and synchronous neuronal activity in the brain that results in transient neurological manifestations such as convulsions, altered consciousness, or abnormal motor activity. The incidence of seizures is highest during infancy and early childhood due to the increased susceptibility of the immature brain to excitatory stimuli. [1,2]

Globally, epilepsy affects nearly 50 million people, and a significant proportion of cases occur in the pediatric population. The burden of seizure disorders is particularly high in developing countries due to factors such as infections, perinatal complications, and inadequate access to healthcare services. [3] Seizures in children may occur due to a variety of etiological factors including febrile illnesses, central nervous system infections, metabolic disturbances, trauma, congenital malformations, and genetic disorders. In many developing regions, infections such as meningitis, encephalitis, and neurocysticercosis remain major causes of seizures among children. [4]

The clinical presentation of seizures varies widely depending on the age of the child, underlying pathology, and type of seizure activity. According to the International League against Epilepsy

(ILAE), seizures can be broadly classified into generalized seizures, focal seizures, and seizures of unknown onset. Among pediatric patients, generalized tonic-clonic seizures are commonly observed, although focal seizures are increasingly recognized with the use of modern neuroimaging and EEG studies. [5,6] The etiological pattern of seizures also varies with age. Neonates and infants commonly present with seizures secondary to birth asphyxia, metabolic disturbances, and congenital anomalies. In contrast, febrile seizures and infections are more frequent in toddlers and preschool children. Structural brain lesions and epilepsy syndromes are more common in older children. [7]

Accurate diagnosis of seizure disorders requires a comprehensive clinical evaluation including detailed history, neurological examination, and appropriate investigations. Electroencephalography (EEG) plays an important role in identifying abnormal cortical activity and predicting recurrence of seizures. Neuroimaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) are useful in identifying structural abnormalities such as tumors, congenital malformations, and infections of the brain. [8,9]

Seizures not only affect the neurological health of children but also have significant psychosocial and economic consequences for families. Recurrent seizures can impair cognitive development, academic performance, and quality of life. Therefore, understanding the clinical profile and etiological distribution of seizures in children is essential for developing effective preventive and therapeutic strategies.

Although several studies have examined pediatric seizures in different regions of India, the epidemiological and clinical characteristics may vary depending on geographical, socioeconomic, and environmental factors. Limited data are available regarding the clinical profile of seizures in children from northeastern India, particularly from Tripura. Hence, the present study was conducted at Tripura Medical College and Dr. BRAM Teaching Hospital, Agartala, Tripura, India, to evaluate the clinical profile, seizure patterns, and etiological factors among children aged 1 month to 12 years admitted with seizures in a tertiary care setting.

Materials and Methods

Study Design: This was a hospital-based observational descriptive study conducted to analyze the clinical profile of seizures among pediatric patients admitted to a tertiary care hospital.

Study Setting: The study was conducted in the Department of Pediatrics at Tripura Medical College and Dr. BRAM Teaching Hospital, Hapania, Agartala, Tripura, India, a tertiary care teaching hospital that serves as a major referral center for pediatric neurological emergencies in the region.

Study Duration: The study was carried out over a period of 24 months.

Study Population: Children aged 1 month to 12 years admitted with seizures in the pediatric ward or pediatric intensive care unit (PICU) during the study period were included in the study.

Sample Size: A total of 250 children fulfilling the inclusion criteria were enrolled in the study.

Inclusion Criteria

- Children aged 1 month to 12 years
- Children admitted with one or more episodes of seizures
- Children whose parents or guardians provided informed consent

Exclusion Criteria

- Neonates less than 1 month of age
- Children with pseudo-seizures or non-epileptic events
- Children with incomplete clinical records
- Children whose parents refused consent

Data Collection

Detailed information was collected using a structured proforma, which included:

1. Demographic Details

- Age
- Gender
- Residence
- Socioeconomic status

2. Clinical History

- Duration and frequency of seizures
- Fever preceding seizures
- Developmental history
- Birth history
- Family history of seizures
- History of trauma or infection

3. Clinical Examination

All children underwent detailed physical and neurological examination including:

- Level of consciousness
- Signs of meningeal irritation
- Presence of focal neurological deficits
- Developmental assessment

4. Classification of Seizures

Seizures were classified according to the International League against Epilepsy (ILAE) classification into:

- Generalized seizures
- Focal seizures
- Unclassified seizures

5. Laboratory Investigations

The following investigations were performed where indicated:

- Complete blood count (CBC)
- Blood glucose
- Serum electrolytes (Na, K, Ca)
- Blood culture
- Cerebrospinal fluid (CSF) examination

6. Neurodiagnostic Investigations

To determine the underlying etiology, the following tests were carried out:

- Electroencephalography (EEG)
- Computed Tomography (CT) scan of brain
- Magnetic Resonance Imaging (MRI) where required

7. Outcome Measures

The following parameters were recorded:

- Type of seizure
- Etiological diagnosis
- Duration of hospital stay
- Treatment given
- Clinical outcome at discharge

Statistical Analysis: All collected data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to present demographic variables and clinical findings. Results were expressed as frequencies, percentages, mean, and standard deviation. Statistical significance was considered at $p < 0.05$.

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Results

A total of 250 children aged 1 month to 12 years admitted with seizures at Tripura Medical College and Dr. BRAM Teaching Hospital, Agartala, Tripura, India, were included in the study. The demographic characteristics, seizure types, and etiological distribution were analyzed.

Table 1: Age and Gender Distribution of Study Participants

Variable	Category	Number (n=250)	Percentage	P value
Age Group	1 month – 1 year	60	24.0%	
	1 – 5 years	110	44.0%	
	6 – 10 years	55	22.0%	
	11 – 12 years	25	10.0%	
Gender	Male	150	60.0%	0.031
	Female	100	40.0%	

The majority of children belonged to the 1–5 year age group (44%), followed by infants (24%). This indicates that seizures are more common during early childhood when the brain is more susceptible to excitatory stimuli. A male predominance (60%) was observed among seizure patients, and the difference was statistically significant ($p<0.05$), suggesting a slightly higher incidence among male children.

Table 2: Distribution of Types of Seizures

Type of Seizure	Number	Percentage	P value
Generalized tonic-clonic seizure (GTCS)	145	58%	**p-value 0.001**
Focal seizures	55	22%	
Febrile seizures	35	14%	
Status epilepticus	15	6%	

Generalized tonic-clonic seizures were the most common type of seizure (58%), followed by focal seizures (22%). Febrile seizures accounted for 14% of cases, while status epilepticus was observed in 6% of patients. The distribution of seizure types showed a statistically significant difference ($p<0.001$), indicating the predominance of generalized seizures among pediatric patients.

Table 3: Etiology of Seizures

Etiology	Number	Percentage	P value
Febrile seizures	90	36%	**p-value 0.001**
CNS infections (meningitis/encephalitis)	70	28%	
Epilepsy	45	18%	
Metabolic causes	20	8%	
Structural brain lesions	15	6%	
Unknown	10	4%	

Febrile seizures were the most common cause (36%), followed by central nervous system infections (28%). Epilepsy accounted for 18% of cases. Metabolic causes and structural brain abnormalities contributed to a smaller proportion of cases. The etiological distribution showed statistical significance ($p<0.001$), indicating that infectious and fever-related conditions are major contributors to pediatric seizures.

Discussion

Seizures are one of the most frequent neurological emergencies encountered in pediatric practice and represent a major cause of hospital admissions worldwide. The present study evaluated the clinical profile and etiological distribution of seizures in 250 children aged 1 month to 12 years admitted to a tertiary care hospital in Tripura.

In the present study, the majority of patients were in the 1–5 year age group, accounting for 44% of cases. This finding is consistent with previous studies which reported that seizures occur most frequently in younger children due to increased neuronal excitability in the developing brain. A similar study conducted in a tertiary care hospital reported that about 60% of seizure cases occurred in children aged 1–5 years. [10]

Male predominance was observed in the present study, with males accounting for 60% of seizure cases. Similar findings have been reported in several previous studies where males constituted approximately 58–63% of cases. [11] The reason for male predominance may be related to genetic susceptibility and higher exposure to environmental risk factors.

In the present study, generalized tonic-clonic seizures (GTCS) were the most common seizure type, accounting for 58% of cases. Previous studies have also reported generalized seizures as the most frequent type among children presenting with seizures. A cross-sectional study evaluating the clinical profile of seizures found that approximately 81.7% of children presented with generalized tonic-clonic seizures, highlighting the predominance of generalized seizure patterns in pediatric populations. [12]

Febrile seizures were identified as the most common etiological factor in the present study, accounting for 36% of cases. Febrile seizures are the most common type of seizures in children, particularly between 6 months and 5 years of age, and they usually occur in association with fever without evidence of central nervous system infection. Previous research has shown that febrile seizures constitute a large proportion of pediatric seizure cases, often representing the leading cause of convulsions in children admitted to hospitals. [13] Central nervous system infections such as meningitis and encephalitis were the second most common cause in the present study (28%). This finding is consistent with several studies conducted in developing countries where infectious diseases remain major contributors to seizure disorders in children. In a tertiary care study, CNS infections were reported as a significant cause of seizures due to the high prevalence of infectious diseases in developing regions. [14]

Epilepsy accounted for 18% of seizure cases in this study. Epilepsy is a chronic neurological disorder characterized by recurrent unprovoked seizures and requires long-term management with antiepileptic drugs. Early diagnosis and appropriate treatment are essential to prevent recurrence and improve quality of life in affected children [15].

Metabolic disturbances such as hypoglycemia, hypocalcemia, and electrolyte imbalance accounted for 8% of cases in the present study. These causes are particularly important in infants and young children because they are potentially reversible if identified early [16].

Structural brain abnormalities such as congenital malformations and tumors accounted for 6% of cases. Neuroimaging techniques such as CT and MRI play an important role in detecting these abnormalities and guiding further management.

Overall, the findings of the present study are consistent with previous research demonstrating that febrile seizures and central nervous system infections are the leading causes of seizures in children admitted to tertiary care hospitals.

Early recognition and prompt management of these conditions are crucial for reducing morbidity and preventing long-term neurological complications.

Conclusion

Seizures are a common neurological emergency among children and represent a significant cause of hospitalization. The present study showed that seizures occur most frequently in children aged 1–5 years, with a male predominance.

Generalized tonic-clonic seizures were the most common type of seizure observed. Febrile seizures and central nervous system infections were identified as the leading etiological factors. Early diagnosis and prompt treatment of underlying causes are essential to prevent complications and improve clinical outcomes.

Further multicenter studies with larger sample sizes are recommended to better understand the epidemiology and risk factors associated with pediatric seizures.

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