



Original Research Article

A CROSS – SECTIONAL STUDY OF CLINICAL PROFILE AND SHORT-TERM OUTCOME OF SEIZURES IN CHILDREN AT A TERTIARY HEALTH CARE INSTITUTE

Lovina Singhani¹, Dnyanda Chawre¹, Ashwini Kundalwal²

¹Junior Resident, Department of Pediatrics, SMBT Institute of Medical Sciences & Research Centre (IMSRC), Nashik, Maharashtra, India.

²Associate Professor, Department of Pediatrics, SMBT Institute of Medical Sciences & Research Centre (IMSRC), Nashik, Maharashtra, India.

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Corresponding Author:

Dr. Lovina Singhani,
Junior Resident, Department of Pediatrics, SMBT Institute of Medical Sciences & Research Centre (IMSRC), Nashik, Maharashtra, India.
Email: singhanilovina@gmail.com

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ABSTRACT

Background: Seizures are among the most common neurological emergencies in children and contribute significantly to paediatric hospital admissions. The etiological spectrum varies with age and geographic region, with febrile seizures being the most common cause in younger children. This study was conducted to evaluate the etiology, clinical profile, and short-term outcomes of seizures in children admitted to a tertiary care hospital. Aims and Objective is to study the etiology, clinical presentation, neurodiagnostic findings, and immediate outcomes of seizures in children.

Materials and Methods: A cross-sectional study was conducted in the Department of Paediatrics at a tertiary care teaching hospital over 6 months. A total of 101 children presenting with seizures were included. Clinical details, laboratory investigations, neuroimaging, EEG findings, complications, and outcomes were recorded and analysed using descriptive statistics.

Results: A total of 101 children with seizures were studied. Most belonged to the 1–5 years age group (45.5%) and were males (61.4%). Fever was present in 83.2% of cases. Generalized tonic–clonic seizures were the predominant seizure type (81.2%), while febrile seizures were the most common etiology (46.5%), followed by epilepsy disorders (10.9%) and CNS infections (10.0%). MRI brain was abnormal in 47.5% of the 59 children evaluated, with cerebral edema and hypoxic ischemic changes being the commonest findings. EEG abnormalities were observed in 33.7% of children. Most patients improved and were discharged without complications (83.2%). Developmental delay (6.9%) and aspiration pneumonia (5.0%) were the most frequent complications. Abnormal EEG findings were significantly associated with polytherapy ($p = 0.006$).

Conclusion: Febrile seizures were the leading etiology, and generalized tonic–clonic seizures were the most common clinical presentation. Most children had favorable short-term outcomes with timely diagnosis and management. Early etiological evaluation, supported by EEG and neuroimaging, is crucial for optimizing outcomes and reducing seizure-related morbidity in children.

Keywords: Seizures, Children, Febrile seizures, GTCS, EEG, Neuroimaging.

INTRODUCTION

Seizures are among the most common neurological emergencies in children and account for a significant proportion of pediatric hospital admissions. A seizure is defined by the International

League Against Epilepsy (ILAE) as a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain. The incidence is highest in early childhood, particularly below five years of

age, due to the vulnerability of the developing brain.^[1]

The etiology of seizures in children varies with age and geographic region. Studies have shown that febrile seizures account for the majority of pediatric seizure cases, especially in children aged 6 months to 5 years. Febrile seizures are the most common cause in younger children, while epilepsy, central nervous system (CNS) infections, metabolic disturbances, and structural brain abnormalities also contribute significantly. Early identification of the underlying cause is essential for prompt treatment and prevention of complications. Other important causes include meningitis, encephalitis, hypoglycemia, and electrolyte imbalance. Seizures are also a major source of parental anxiety and may lead to considerable morbidity if not managed appropriately.^[2]

The burden of pediatric seizures is particularly high in developing countries like India, where approximately 4%–10% of children experience at least one seizure during childhood.^[3,4] About 30% of children presenting with a first afebrile seizure may eventually develop epilepsy, which is defined as two or more unprovoked seizures occurring more than 24 hours apart.^[5] Clinically, seizures may present as generalized tonic–clonic movements, altered consciousness, focal neurological deficits, or behavioral changes. Accurate classification into generalized and focal seizures is important for determining etiology and prognosis.

Need for the study: The etiological profile of seizures differs according to age, socioeconomic conditions, and geographic region, especially in developing countries like India where febrile illnesses and CNS infections are highly prevalent. Early recognition of the underlying cause is essential for prompt management and prevention of complications.

Limited regional data are available regarding the clinical profile, etiological spectrum, neurodiagnostic findings, and short-term outcomes of seizures in children attending tertiary care hospitals. Therefore, this study was undertaken to evaluate the etiological factors, clinical presentation, and immediate outcomes of seizures in children aged 1 month to 16 years, which may help in improving diagnostic strategies, treatment, and preventive measures.

MATERIALS AND METHODS

Study Design: Cross-Sectional study.

Study setting: Department of Pediatrics in a tertiary care teaching hospital.

Study period: 6 months

Study Population: Children aged 1 month to 16 years admitted with seizures.

Inclusion Criteria

All children from 1 month to 16 years of age who presented to pediatrics department with convulsions were included in the study after obtaining informed consent from their parents or guardians.

Exclusion Criteria

- Children less than 1 month
- Children who were already enrolled in the study came for follow up were excluded from the study.

Data Collection: Data was collected using Pre-designed case record proforma, Clinical examination findings, Laboratory investigations, Neurodiagnostic investigations and Hospital medical records.

Data collection procedure/method:

- Children aged 1 month to 16 years presenting with seizures was enrolled after obtaining informed consent from parents/guardians.
- A detailed clinical history was taken including seizure characteristics, fever, past history, birth history, developmental history, and family history.
- A complete physical and neurological examination was performed.
- Necessary laboratory investigations were carried out to identify metabolic or infectious causes.
- EEG and neuroimaging (CT/MRI brain) was performed whenever clinically indicated.
- The etiology of seizures was determined based on clinical findings and investigations.
- All relevant information was recorded in the case proforma.
- Patients were followed until discharge or clinical outcome during hospital stay.

Statistical analysis plan

- Data was entered in Microsoft Excel and analyzed using SPSS software.
- Descriptive statistics such as mean, standard deviation, frequencies, and percentages was used to summarize data.
- Chi-square test used to determine association between categorical variables. A p-value <0.05 considered statistically significant.

RESULTS

Among 101 children with seizures, the highest proportion belonged to the 1–5 years age group (45.5%), followed by 1 month–1 year age group (18.8%). Male children (61.4%) were more commonly affected than females (38.6%).

Fever was present in the majority of children with seizures (83.2%), while 16.8% had no history of fever.

Table 1: Distribution of Types of Seizures (n = 101)

Type of Seizure	Frequency (n)	Percentage (%)
Generalized tonic–clonic seizure (GTCS)	82	81.2

Myoclonic seizure	3	3.0
Focal seizure disorder	7	7.0
Status epilepticus	3	3.0

Generalized tonic-clonic seizures (GTCS) were the most common type of seizure observed (81.2%). Status epilepticus was seen in 3.0% cases, while

focal seizures and myoclonic seizures accounted for 7.0% and 3 % respectively.

Table 2: Etiological Factors Responsible for Seizures (n = 101)

Etiology	Frequency (n)	Percentage (%)
Febrile seizure	47	46.5
CNS infection/Meningitis	10	10
Birth asphyxia/HIE	9	8.9
Metabolic causes	7	6.9
Epilepsy disorder	11	10.9
Structural abnormality	5	5.0
Trauma	2	2.0
Idiopathic/Others	6	5.9
Genetic syndrome	4	4

Febrile seizure was the most common etiological factor for seizures (46.5%), followed by CNS infections/meningitis (10%) and epilepsy disorders

(10.9%). Birth asphyxia/HIE contributed to 8.9% of cases.

Table 3: Laboratory Findings in Children with Seizures (n = 101)

Laboratory Parameter	Mean ± SD
Blood Sugar Level (mg/dL)	109.6 ± 26.4
C-Reactive Protein (mg/L)	11.8 ± 24.5
Hemoglobin (g/dL)	11.2 ± 1.8
Serum Sodium (mEq/L)	138.4 ± 5.2
Serum Potassium (mEq/L)	4.2 ± 0.7
Serum Calcium (mg/dL)	9.1 ± 1.1

The mean blood sugar level was 109.6 ± 26.4 mg/dL. Mean hemoglobin level was 11.2 ± 1.8 g/dL, while mean serum sodium, potassium, and

calcium levels were 138.4 ± 5.2 mEq/L, 4.2 ± 0.7 mEq/L, and 9.1 ± 1.1 mg/dL respectively.

Table 4: Neuroimaging Findings in Children with Seizures (n = 59)

Neuroimaging Findings	Frequency (n)	Percentage (%)
Normal MRI Brain	31	52.5
Cerebral edema	6	10.2
Hypoxic ischemic encephalopathy changes	5	8.5
Structural brain abnormalities	4	6.8
Corpus callosal abnormalities	2	3.4
Periventricular leukomalacia	2	3.4
Brain atrophy	2	3.4
Hydrocephalus	1	1.7
Calcification/Granuloma	2	3.4
Others	4	6.8

Note: Percentages were calculated among children who underwent MRI brain imaging (n = 59) Among 59 children who underwent MRI brain imaging, normal MRI findings were observed in

52.5% cases. Cerebral edema (10.2%) and hypoxic ischemic encephalopathy changes (8.5%) were the most common abnormal neuroimaging findings.

Table 5: EEG Findings in Children with Seizures (n = 101)

EEG Findings	Frequency (n)	Percentage (%)
EEG Done	80	79.2
EEG Not Done	21	20.8
Normal EEG	46	45.5
Abnormal EEG	34	33.7

EEG was performed in 79.2% children, while 20.8% did not undergo EEG evaluation. Abnormal EEG findings were observed in 33.7% cases.

Table 6: Short-Term Outcome and Complications Associated with Seizures in Children (n = 101)

Outcome	Frequency (n)	Percentage (%)
1. Improved and discharged without complications	84	83.2
2. Improved and discharged with complications		
a. Neurological deficit	7	6.9
b. Aspiration pneumonia	5	5.0
3. Referred to higher centre	4	4.0
4. Mortality	1	1.0

Most children improved and were discharged without complications (83.2%). Developmental delay was observed in 6.9% cases and aspiration

pneumonia in 5%, while mortality was reported in 1.0% children.

Table 7: Association between Antiepileptic Therapy and EEG Findings (n = 101)

EEG Findings	Monotherapy (n=76)	Polytherapy (n=25)	Total	P-value
Normal EEG	40 (52.6)	6 (24.0)	46	0.006*
Abnormal EEG	20 (26.3)	14 (56.0)	34	
EEG Not Done	16 (21.1)	5 (20.0)	21	
Total	76	25	101	

*Statistically significant

Abnormal EEG findings were proportionately more common among children receiving polytherapy

(56.0%) compared with monotherapy (26.3%). This association was statistically significant ($p = 0.006$).

Table 8: Association between Antiepileptic Therapy and History of Fever (n = 101)

History of Fever	Monotherapy (n=76)	Polytherapy (n=25)	Total	P-value
Fever Present	65 (85.5)	19 (76.0)	84	0.272
Fever Absent	11 (14.5)	6 (24.0)	17	
Total	76	25	101	

Fever was present in the majority of children in both treatment groups. However, no statistically significant association was observed between treatment modality and history of fever ($p = 0.272$).

DISCUSSION

The present study evaluated the etiological profile, clinical characteristics, laboratory and neurodiagnostic findings, and short-term outcomes of seizures among children aged 1 month to 16 years presenting to a tertiary care center. The majority of children belonged to the 1–5 years age group (45.5%), with a male predominance (61.4%). Similar findings were reported by Shetty et al,^[1] who observed that seizure disorders were more common in younger children and occurred more frequently in males. The increased vulnerability of this age group may be attributed to developmental immaturity of the central nervous system and increased susceptibility to infectious and febrile illnesses.

Fever was present in 83.2% of children in the present study, highlighting its important role in pediatric seizure disorders. Febrile seizures constituted the most common etiological factor (46.5%), followed by epilepsy disorders (10.9%) and CNS infections (10%). These findings are comparable to those reported by Shetty et al,^[1] and Varma,^[6,7] who identified febrile seizures as the leading cause of seizures in childhood, particularly among children younger than five years of age.

Generalized tonic-clonic seizures (GTCS) were the predominant seizure type, accounting for 81.2% of

cases. Status epilepticus and focal seizure disorders accounted for 6.0% and 4.0% of cases, respectively. Similar observations were reported by Rayamajhi et al,^[8,9] and Abbasi et al,^[3] who found generalized seizures to be the most common clinical presentation in children. Holmes,^[12] also emphasized that generalized tonic-clonic seizures remain the most frequently recognized seizure manifestation in pediatric practice.

The etiological spectrum observed in the present study reflects the multifactorial nature of pediatric seizures. In addition to febrile seizures, CNS infections, hypoxic ischemic encephalopathy, metabolic abnormalities, structural brain lesions, and genetic syndromes contributed significantly to seizure occurrence. Murthy and Yangala,^[4] reported similar findings, highlighting acute symptomatic seizures secondary to infections and metabolic disturbances as major contributors in developing countries. The contribution of meningitis and encephalitis observed in the present study is also supported by the findings of Bhat et al,^[10] and Rayamajhi et al.^[9]

MRI brain was performed in selected patients, with normal findings observed in 52.5% of cases. Among abnormal studies, cerebral edema (10.2%) and hypoxic ischemic encephalopathy-related changes (8.5%) were the most frequent findings. These observations are comparable to those reported by Gupta et al,^[2] who demonstrated the utility of neuroimaging in identifying significant structural abnormalities in children with seizures. The findings further support the recommendations of Gaillard et al,^[13] regarding the role of neuroimaging in

evaluating children with seizures, particularly when underlying neurological pathology is suspected. EEG evaluation was performed in 79.2% of children, and abnormal EEG findings were observed in 33.7% of the total study population. Similar observations were reported by Muniswamappa et al,^[14] who highlighted the importance of EEG in seizure classification and diagnostic evaluation. Furthermore, the present study demonstrated a statistically significant association between antiepileptic therapy and EEG findings, with abnormal EEG patterns being more common among children receiving polytherapy compared to monotherapy (56.0% vs. 26.3%; $p = 0.006$). This finding suggests that children requiring multiple antiepileptic drugs may represent a subgroup with more severe or refractory seizure disorders.^[15]

Most children showed favorable short-term outcomes, with 83.2% improving and being discharged without complications. Developmental delay (6.9%) and aspiration pneumonia (5.0%) were the most commonly observed complications, while mortality was low (1.0%). These findings are consistent with previous studies demonstrating good outcomes in children with febrile and acute symptomatic seizures when timely diagnosis and treatment are instituted. The favorable outcome observed in the present study may be attributed to early recognition, prompt therapeutic intervention, and comprehensive management available at a tertiary care institution.

Overall, the findings of the present study are in agreement with existing Indian and international literature, reaffirming that febrile seizures and generalized tonic-clonic seizures constitute the predominant clinical spectrum of pediatric seizure disorders. Early etiological evaluation, appropriate neurodiagnostic assessment, and timely management remain essential for optimizing outcomes and minimizing seizure-related morbidity in children.

CONCLUSION

The present study demonstrates that pediatric seizures are most common in children aged 1–5 years, with a clear male predominance. Febrile seizures were the leading etiological factor, and generalized tonic-clonic seizures constituted the predominant seizure type.

Epilepsy disorders, central nervous system infections, hypoxic ischemic encephalopathy, metabolic abnormalities, structural brain lesions, and genetic syndromes also contributed significantly to the seizure burden. EEG and MRI brain were

valuable in identifying underlying abnormalities, although normal findings were observed in a substantial proportion of patients.

Most children had favorable short-term outcomes with appropriate management; however, developmental delay and aspiration pneumonia were notable complications. The significantly higher prevalence of abnormal EEG findings among children receiving polytherapy suggests greater disease severity in this subgroup.

Early etiological diagnosis, timely neurodiagnostic evaluation, and prompt therapeutic intervention remain essential for optimizing outcomes and reducing seizure-related morbidity in children.

REFERENCES

- Shetty SK, Anandakumar TS, Kumar GV. Etiological study of seizures among pediatric age group (1–18 years) in tertiary care medical college hospital.
- Marol R, Marol R, Matti S, Marol R. Can we predict occurrence of febrile convulsions in children with fever by increased neutrophil-to-lymphocyte ratio and C-reactive protein?
- Abbasi A, Kazi G, Siddiqui S, Siddiqi Y. Clinical profile and management of children with seizures presenting to paediatrics emergency department: A cross-sectional study. *Int J Surg Open*.
- Murthy JMK, Yangala R. Acute symptomatic seizures—incidence and etiological spectrum: a hospital-based study from South India. *Seizure*. 1999;13:162-165.
- Udani V. Pediatric epilepsy—An Indian perspective. *Indian J Pediatr*. 2005;72(4):309-313.
- Varma RR. Febrile seizures. *Indian J Pediatr*. 2002;69(5):697-700.
- Kalra V. Seizure epilepsy and nonepileptic events. In: Parthasarathy A, Nair MKC, Menon PSN, editors. *IAP Textbook of Pediatrics*. 6th ed. New Delhi: Jaypee Brothers; 2016. p. 326-344.
- Jagoda A, Richardson L. The evaluation and treatment of seizures in emergency department. *Mt Sinai J Med*. 1997;64(4-5):249-259.
- Rayamajhi A, Singh R, Prasad R, Khanal B, Singhi S. Study of Japanese encephalitis and other viral encephalitis in Nepali children. *Pediatr Int*. 2007;49(6):978-984.
- Bhat BV, Verma IC, Puri RK, Srinivasan S, Nalini P. A profile of pyogenic meningitis in children. *J Indian Med Assoc*. 1991;89(8):224-227.
- Scheffer IE, Berkovic S, Capovilla G, Connolly MB, French J, Guilhoto L, et al. ILAE classification of the epilepsies: Position paper of the ILAE Commission for Classification and Terminology. *Epilepsia*. 2017;58(4):512-521.
- Holmes GL. Recognition and management of seizures in children. *Pediatr Rev*. 2018;39(9):456-469.
- Gaillard WD, Chiron C, Cross JH, Harvey AS, Kuzniecky RI, Hertz-Pannier L, et al. Guidelines for imaging infants and children with recent-onset epilepsy. *Epilepsia*. 2009;50(9):2147-2153.
- Angalakuditi M, Angalakuditi N, Narayanan S. Etiological spectrum of pediatric seizures in developing countries. *Int J Contemp Pediatr*. 2019;6(4):1452-1457.
- Muniswamappa S, Ramesh S, Prakash B. Role of electroencephalography in childhood seizures. *Indian J Child Health*. 2021;8(3):112-116.