



## Original Research Article

## Study of clinical profile of children admitted with new onset seizures in a tertiary care urban hospital in South Bangalore

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## ABSTRACT

**Background:** Seizure is one of the common causes of childhood hospitalization with significant mortality and morbidity. There is limited data regarding acute seizures episodes from the developing countries.

**Method and Aim:** This was a hospital based prospective study carried out children admitted in Paediatric intensive care unit of Bangalore Baptist Hospital a tertiary care centre, Bangalore, from 1 month to 15 years of age during the period between September 2018 to January 2020. Current study aims to find the common aetiology of seizure and classify seizure types in various age groups. Variables collected were demographics, clinical presentations, laboratory tests, brain imaging studies, ABR, electroencephalography, diagnosis and hospital course.

**Results:** A total of 200 patients were admitted for seizures with 120 (60%) males and 80 (40%) females. Among these patients, 148 (74%) presented with fever and 148 (74%) of children were less than 5 years of age. Generalized tonic-clonic seizures were the most common seizure type 140 (70%). Seizure disorder (21%), febrile seizures (55%), CNS infections and neurocysticercosis were common etiologies.

**Conclusion:** Convulsion is an important symptom in children admitted with PICU. Seizure occurs in peak frequency in age group of 1yr to 5 years. Febrile seizures was the common causes of seizures in febrile children. Children diagnosed as seizure disorder require long term follow up studies including neurophysiologic studies.

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### 1. Introduction

Convulsions are not a disease entity but are symptom complex which may result from a vast number of diseases. It is not possible to pin point an aetiology in all cases, a good number of cases remain idiopathic.

Several terms are used for convulsive disorders. "Seizure" is the least specific and refers to a variety of paroxysmal events, which are due to abnormal electrical activity in cerebral neurons. "Convulsions" are referred to those type of seizures that include only motor phenomena, either repetitive (clonic) or maintained (tonic) involuntary contractions of muscles, which may be generalized or confined to the specific muscle groups. "Epilepsy" refers to

recurrent seizures either of unknown aetiology (idiopathic epilepsy) or due to congenital or acquired brain lesions (symptomatic, organic or secondary epilepsy).

An epileptic syndrome is a disorder that manifests one or more specific seizure types, has a specific age of onset and a specific prognosis.

It has been estimated that about 4 to 6% of all children have seizures some time or other time during their life. 90% of convulsive disorders have their onset in early life. 1 in 15 or 20 children admitted in hospital give a history of convulsion (Livingston 1954). Epilepsy is very common accounting for 4/1000 populations.

Though convulsion is an obvious manifestation of some underlying condition it produces scare in the parents. It is necessary to find out exact cause of convulsion.

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Number of diseases causing convulsion are ranging from birth trauma, asphyxia, infections, metabolic disorders, electrolyte disturbances, neuro-anatomical defects, and degenerative diseases to idiopathic group.

Seizures occur with a relatively high frequency during newborn period and present special problems in terms of their diagnosis and treatment, being genetic, biochemical electrophysiological factors involved in seizures.

Seizures is a common indication for admission in PICU. However detailed study regarding the aetiology and severity were lacking. Hence we have conducted the study to evaluate the incidence, aetiology and severity of convulsion in PICU.

## 2. Objectives of the study

1. To study various types of seizures in childhood, beyond neonatal
2. Period up to 15 years.
3. To identify various etiological factors giving rise to convulsions in PICU.
4. To correlate each type of convulsion with various etiological factors.

## 3. Materials and Method

### 3.1. Source of data

The study was done on 200 consecutive cases admitted in Pediatric intensive care unit of Bangalore Baptist Hospital a tertiary care centre, Bangalore, to know the various etiologies of convulsions in children between 1 month to 15 years of age during the period between September 2018 to January 2020. Ethical clearance was obtained from Bangalore Baptist Hospital ethics committee.

### 3.2. Sample size

$$SS = \frac{Z^2 \times p \times (1 - p)}{C^2}$$

SS = Sample Size  
 Z = Z-value<sup>a</sup> (e.g., 1.96 for a 95 percent confidence level)  
 P = Percentage of population picking a choice, expressed as decimal<sup>b</sup>  
 C = Confidence interval, expressed as decimal (e.g., .04 = +/- 4 percentage points)

A Z-values (Cumulative Normal Probability Table) represent the probability that a sample will fall within a certain distribution.

The Z-values for confidence levels are:  
 1.645 = 90 percent confidence level  
 1.96 = 95 percent confidence level  
 2.576 = 99 percent confidence level

**Fig. 1:**

### 3.3. Data collection technique and tools

Cases were selected according to the inclusion criteria. A detailed history was taken from the reliable source,

such as parents or guardian using predesigned proforma by direct interview method and clinical examination was done according to proforma.

### 3.4. Investigation

1. Cases in which diagnosis was not established from the clinical history and examination, the child was investigated, keeping in mind more than one cause in any one case.
2. The following investigations were carried out routinely in all patients presenting with convulsions- CBC, blood sugar, S.Creatinine, S.Electrolytes and calcium.
3. If and when indicated, MP QBC, Mantoux, Widal/ IgM Dengue, ABG, Blood culture, CSF Analysis, S.Lactic acid. S.Ammonia, X-Ray Chest/Skull were done. Neurosonogram, electroencephalogram (EEG), CT/MRI brain, funduscopy and other specific investigations were done, if indicated.
4. CSF analysis is considered in patients with meningeal signs, altered mental status, prolonged post ictal period or if any doubt about possibility of meningitis and it is performed in the first episode of febrile seizures in infants below one year 6 months or where meningitis may be suspected.
5. Neuroimaging was done in cases with altered neurological examination like meningeal signs, signs of raised intra cranial pressure and neurological deficits.
6. EEG was done in cases with unprovoked seizures and children with developmental delay after one week of seizure episode.

### 3.5. Inclusion criteria

Children between 1 month to 15 years who were admitted with history of new onset seizure (first episode of seizure), in PICU of Bangalore Baptist Hospital.

### 3.6. Exclusion criteria

1. Children less than 1 month (as the causes of neonatal seizures are different).
2. Children with past history of seizures.

### 3.7. Method of statistical analysis

The following methods of statistical analysis have been used in this study. The Excel and SPSS (SPSS Inc, Chicago ver 10.5) software packages were used for data entry and analysis.

The results of categorical data presented in numbers and percentage for in Table and Figure.

Proportions were compared using Chi-square test of significance

Chi-Square ( $c^2$ ) test for (r x c tables)

## 4. Results

200 Cases of paediatric convulsive patients who are admitted to paediatric ICU were analysed according to different characteristics and are presented in the following tables.

### 4.1. Age & sex wise distribution

Out of 200 cases maximum cases, (49.5%) were between more than 1yr to 5 years, followed by 41 cases (21.5%) between more than 5yrs to 10 Years and 36 cases (18.%) between more than 6 months to 1 year. Among 200 children included in the study 120 are males (60%) and females are 80 (40%). So seizure is common among males according to this study.

### 4.2. Type of convulsion

Maximum 140 cases (70%) were generalized tonic-clonic type, followed by focal seizure of 19% of which complex partial seizures 11.5%, simple partial seizures 7.5% and status epileptics 7%. Myoclonic and secondary generalized were observed to be less.

### 4.3. Age wise distribution of various types of convulsions

TCS was the commonest type of convulsion in age group between 1 month to 10yrs. In age group between 10 to 15yrs focal seizure was common. GTCS constitutes 77% including status epileptics (7%) followed by focal seizure 19% out of which complex partial seizure constitutes 11.5% and simple partial seizure constitutes 7.5%.

### 4.4. Associated symptoms

Fever is the common associated symptoms with convulsion in 74% of cases of which 54% of cases are febrile convulsion and 12% of cases of CNS infections. Vomiting and headache in 14% of cases of which CNS infections constitutes 11% and metabolic disease (3%). Cough and cold is associated with 19.5% and diarrhoea in 10.5% of cases. Rash is associated in 3% of cases. 16.5% cases had no associated symptoms.

### 4.5. Family history of seizure

There was family history of seizure in 21.5% of cases, of which 88.5% was from febrile convulsion and 11.5% of epilepsy.

### 4.6. Mile stones

There was developmental delay in 8% of cases of which cerebral palsy constitutes 7% of cases, 1% of case in atypical febrile convulsion.

### 4.7. Cns examination findings

Alerted sensorium was the commonest finding 29.5% followed by neurological deficit in 10.5% and meningeal signs in 6% of cases. Motor Signs [Neurological deficits, Cranial nerve palsy and

### 4.8. No. of episodes of convulsions during the illness

65% of cases had one episode of convulsion of which typical febrile convulsion was common. Remaining 35% of cases had more than one episodes of convulsion of which commonest was atypical febrile convulsion followed by unprovoked seizure.

### 4.9. Etiological factors of seizure

This table represents etiological factors of seizures in children of different

The most common cause is febrile seizure with 55% of which typical febrile convulsion (33.5%) and atypical febrile convulsion (21.5%), followed by neuroinfection-16.0% and unprovoked seizure 10.50%.

**Table 1:** age groups in post neonatal Period up to 15 years.

Cause of convulsion	No. of Cases	Percentage%
1. Typical febrile Convulsion	67	33.50
2. Atypical febrile Convulsion	43	21.50
3. Unprovoked seizure	21	10.50
4. Metabolic	15	7.50
5. Neuroinfection	32	16.00
6. Cerebral palsy	14	7.00
7. Poisoning	03	1.50
8. Tumor	01	0.50
9. Head Injury	02	1.00
10. Intracranial Hematoma	02	1.00
<b>Total</b>	<b>200</b>	<b>100%</b>

**Table 2:** Cns infection with seizures

S.No.	Clinical features	No. of children (%)
1.	Pyogenic meningitis	12(6.0%)
2.	Tuberculous meningitis	1(0.50%)
3.	Viral encephalitis	7(3.50%)
4.	Neurocysticercosis	7(3.50%)
5.	Tuberculoma	2(1.00%)
6.	Cerebral Malaria	2 (1.00%)
7.	Cerebral Abscess	1(0.50%)
	<b>Total</b>	<b>32 (16.0%)</b>

CNS infections constitutes 16% of total cases of which, pyogenic meningitis was commonest 6% followed by viral encephalitis and neurocysticercosis 3.5%.

#### 4.10. Correlation of type of seizures with various etiologies

The above table represents etiological factors and their correlation with various types of seizures in children in the age groups of 1 month to 15 years (n=200). GTCS is the commonest type of seizure.

GTCS is the commonest type of seizure in aetiologies like typical febrile convulsion and atypical febrile convulsion.

#### 4.11. Age group from 1 month to 6 months

This age group constitutes 6.5% of total cases. The commonest cause of convulsion in infants between 1 month to 6 months is metabolic (53.8%) among them commonest cause is hypocalcemia. This is followed by meningitis (23.07%).

#### 4.12. Age group more than 6 months to one year (n=35)

This age group constitutes 17.5% of total cases. Febrile convulsion is the commonest cause of convulsion in this age group constitutes (77.1%) of which typical febrile convulsion (42.8%) and atypical febrile convulsion (34.25%), followed by cerebral palsy (8.5%) and unprovoked seizures (5.7%) of cases had new onset seizures.

#### 4.13. Etiology of seizures in age group more than 1 years to 5 years (n=99)

This age group constitutes 49.5% of total cases. Febrile convulsion is the commonest cause of convulsion in this age group constitutes 69.6% of which typical febrile convulsion (41.4%) and atypical febrile convulsion (28.2%), followed by epilepsy (11.1%) and cerebral palsy (6.06%) of cases had new onset seizures.

#### 4.14. Etiology of seizures in age group more than 5 years to 10 years (n=41)

This age group constitutes 20.5% of total cases, of which 30% of cases are between 5yrs to 6yrs, among them typical febrile seizures were most common (21.3%) and atypical febrile convulsion (7.3%). The commonest cause of seizures above 6yrs is encephalitis (14.6%) followed by epilepsy (9.7%).

#### 4.15. Etiology of seizures age group more than 10 years (n=11)

This age group constitutes 5.5% of total cases. In this age group most common cause is epilepsy (36.3%) followed by meningitis (27.7%).

Among Neuroinfection pyogenic meningitis is commonest followed by neurocysticercosis, viral

encephalitis, Tuberculous meningitis, tuberculoma and cerebral malaria.

## 5. Discussion

This was a hospital based prospective study of children admitted with acute episode of seizure in a tertiary care center in Bangalore south from September 2018 to January 2020. It aimed in studying demographics, clinical seizure types, etiologies of seizure in those children. Neonates were excluded from the study because frequently they have conditions like septicemia, hypoxic-ischemic encephalopathy, metabolic disorders which comprise one spectrum of diseases.

### 5.1.

#### 5.1.1. Demographics and clinical seizure types

Most studies show high incidence of seizures in younger children with a decreasing frequency in older age group and more common in males.<sup>1,2</sup> Most children with seizures in our study were younger than 5 years of age. Males had higher prevalence compared to female in age groups Male to female ratio of 1.5:1. Seizures coexisted with fever in 70% of cases. Most studies show generalized seizures are much more common compared to partial seizure.<sup>3,4</sup> In the current study generalized tonic-clonic was commonest seizure type and found to have higher incidence among febrile children. Partial seizure was common among children with unprovoked seizures and metabolic.<sup>5</sup> Partial seizures represented only (19.8%) of children in the current study. Only 35% children presented with recurrent seizures while the rest came as first time presentation. Of the recurrent category maximum were cases of either atypical febrile seizures and unprovoked seizures. Family history of seizures present in 21.5% of cases, of which 88.5% was from febrile convulsion and 11.5% of epilepsy. Altered sensorium was the commonest CNS finding 29.5% in seizures cases.

#### 5.1.2. Etiological profile

Febrile seizures have been reported to be one of the most common causes of seizure attack in children.<sup>2,3,6</sup> We found that febrile seizures (41.0%) were the main etiology of a first attack of seizure in children less than 5 years of age. Overall febrile seizure was commonest etiology in children aged 6 months to 15 years (55%) followed by neuroinfection and unprovoked seizures. Among neuroinfection pyogenic meningitis is commonest followed by neurocysticercosis and viral encephalitis.

1. 200 cases of seizures in age group of 29 days to 15 years admitted in paediatric ward of Bangalore Baptist Hospital are reviewed.
2. In these cases, type, aetiology and clinical features of seizures were studied

3. Convulsions occurred in 90% of total admissions during this period
4. Male to female ratio was 1.5:1
5. GTCS (70%) was observed to be the commonest subtype and was 3.6 times as common as partial seizures (22%).
6. Febrile seizures (55%) was the commonest cause of convulsions in the PICU followed by unprovoked seizures (10.5%) and Metabolic (7.5%) in post neonatal period in children
  - a) Typical febrile convulsions - 55%.
  - b) Epilepsy - 10.5%
  - c) Metabolic - 7.5%
7. Seizures were found to have peak frequency in the age group of 1 to 5 years (49.5%).
8. In the age group < 6 months, the leading cause of convulsions in our PICU was Metabolic disturbances (43%) followed by Meningitis (23%).
9. In the age group more than 6 months – 1 years, leading cause is febrile seizure (77.1%) of which typical febrile seizures (42.8%) and Atypical febrile seizures (34.25%) followed by cerebral palsy (8.5%).
10. In the age group more than 1 year-5 years, leading cause of seizure is febrile convulsion (69.6%) of which typical febrile seizure (41.4%) and Atypical febrile seizures (28.2%), followed by unprovoked seizures (11.1%).
11. In the age group more than 5-10 years, 30% of cases are between 5 yrs to 6 yrs, among them typical febrile seizures were most common (21.3%) and atypical febrile convulsion (7.3%). The commonest cause of seizures above 6 yrs is encephalitis (14.6%) followed by epilepsy (9.7%).
12. In the age group above 10 years, leading cause of seizure is epilepsy (36.3%)
13. Fever was an associated symptom with seizures in 74% of cases. Other symptoms were cough and cold (19.5%), vomiting and headache (14%), diarrhoea (10.5%) rash (3%).

## 6. Conclusion

Seizures are not only the cause of high morbidity and mortality in children but also are the reasons of physical, mental and financial distress for their parents. Convulsion is an important symptom in children admitted with PICU.

The occurrence of seizures was high in males, 60% when compared to females, 40%. The commonest type of

seizure was generalized tonic clonic (77%). Focal seizures constituted 22%.

Seizure occurs in peak frequency in age group of 1 yr to 5 years. Family history of seizure was present in 21.5% of total cases. 34.5% of febrile convulsion had family history. In 89.5% of acute symptomatic seizures underlying aetiologies were identified. Etiological spectrum of seizures were varied and included febrile convulsion, epilepsy, metabolic disturbance, neuroinfection, cerebral palsy. The common etiology of seizure in all age group is febrile convulsion. Among the neuroinfection, pyogenic meningitis was common followed by Neurocysticercosis and viral encephalitis.

## 7. Source of Funding

None.

## 8. Conflict of Interest

None.

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