

Original research article**Clinical profile and short-term outcome of pediatric status epilepticus at a tertiary care hospital****¹Dr. Asadkhan S Pathan, ²Dr. Shivprasad K Mundada**¹Assistant Professor, Department of Pediatrics, Vilasrao Deshmukh Government Medical College, Latur, Maharashtra, India²Professor & HOD, Department of Pediatrics, Vilasrao Deshmukh Government Medical College, Latur, Maharashtra, India**Corresponding Author:**

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Abstract

Background: Status epilepticus is more frequent in children than in adults and occurs in a variety of settings, especially in children with infections, and patients with previously established epilepsy, cerebral malformations, hypoxia, hypoglycaemia and head trauma. Present study was aimed to study clinical profile and short-term outcome of pediatric status epilepticus at a tertiary care hospital.

Material and Methods: Present study was single-center, prospective, descriptive & observational study, conducted in children of age 1 month to 12 years, either gender, admitted with status epilepticus or developed status epilepticus during the course of their illness.

Results: In present study, 108 children with status epilepticus were studied. Majority of children were from 1-3 years age group (56.48%), boys (60.19%), had generalized tonic-clonic (60.19%) & history of status epilepticus was present in 30.56% patients. Atypical febrile seizures (39.81%) was most common etiology noted followed by meningitis (15.74%), cryptogenic (12.96%), hypoglycemia (12.04%) & encephalitis (8.33%). Average duration of ICU stay was 3 ± 1.23 days, while average duration of hospital stay was 5.43 ± 2.78 days. Intubation was required in 17 (15.74%) cases, while 13 (16.25%) cases required mechanical ventilation & average duration of mechanical ventilation was 1.24 ± 0.5 days. Total mortality was 4.63% (5 cases), 3 cases had acute CNS injury & rest 2 had progressive encephalopathy, median survival time was 1.52 ± 0.67 days.

Conclusion: 1-3 years age group, boys & history of status epilepticus, atypical febrile seizures were common risk factors for status epilepticus.

Keywords: Status epilepticus, paediatric emergency, febrile seizures, neurological damage

Introduction

The new definition of Pediatric Status Epilepticus states a seizure activity lasting for more than 5min with or without loss of consciousness. This definition makes early treatment assessment and intervention before the seizure becomes refractory to the anti-epileptic drugs^[1, 2]. It is estimated that 1.3 to 16% of all patients with epilepsy will develop SE at some point in their lives^[3]. Approximately 70% of SE occurs in children less than one year, 75% in less than three years of age and the first episode most commonly occurs around 2.5 years after initial diagnosis^[4].

It is more frequent in children than in adults and occurs in a variety of settings, especially in children with infections, and patients with previously established epilepsy, cerebral malformations, hypoxia, hypoglycaemia and head trauma. In many cases, SE can be the first unprovoked manifestation of a seizure disorder^[5].

If status epilepticus not controlled can lead to various complications such as cardiac dysrhythmias, metabolic derangements, autonomic dysfunctions, hyperthermia, pulmonary aspiration and permanent neurological damage^[6]. Present study was aimed to study clinical profile and short-term outcome of pediatric status epilepticus at a tertiary care hospital.

Material and Methods

Present study was single-center, prospective, descriptive & observational study, conducted in Department of Pediatrics, Vilasrao Deshmukh Government Medical College, Latur, India. Study duration was of 2 years (July 2019 to June 2021). Study approval was taken from institutional ethical committee prior to start of study.

Inclusion criteria

- Children of age 1 month to 12 years, either gender, admitted with status epilepticus or developed

status epilepticus during the course of their illness, willing to participate in study.

Exclusion criteria

- Neonatal seizures. Seizures in developmentally abnormal children.
- Parents/guardians not willing to participate

Study was explained & a written informed consent was taken from guardians before participation in study. Clinical details such as present complaints, demographic data, past history of seizures, birth history, developmental history, family history, drug history, immunization status were noted. Detailed clinical examination including a complete neurological examination was done. Investigations as complete haemogram, blood sugar, Serum sodium, Serum calcium were done for all patients. Liver function test, chest X-ray, Mantoux test, CSF analysis, EEG antiepileptic drug (AED) levels, toxicological studies, lumbar puncture, electroencephalography, and neuroimaging (Computed tomography [CT] scan and Magnetic resonance imaging [MRI] were done wherever indicated and results recorded.

Treatment details, clinical course, outcome with regard to complete recovery, any neurological deficits, morbidity and mortality were noted.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version & data was analysed with descriptive statistics.

Results

In present study, 108 children with status epilepticus were studied. Majority of children were from 1-3 years age group (56.48%), followed by age group 1 month to 12 months (21.30%). Among all children boys were (60.19%) more as compared to girls (39.81%). Majority patients had generalized tonic-clonic (60.19%) seizures followed by focal seizures, impaired awareness (20.37%), focal seizures evolving to bilateral tonic-clonic (11.11%) & generalized tonic seizures (8.33%). History of status epilepticus was present in 30.56% patients; mean seizure duration was 17.5 ± 11.7 minutes.

Table 1: patient characteristics

Characteristic	Number of Cases	Percentage
Age distribution (years)		
1 month to 12 months	23	21.30%
1-3 years	61	56.48%
4-6 years	11	10.19%
6-12 years	13	12.04%
Sex distribution		
Boys	65	60.19%
Girls	43	39.81%
Type of seizures		
Generalized tonic-clonic	65	60.19%
Focal, impaired awareness	22	20.37%
Focal evolving to bilateral tonic-clonic	12	11.11%
Generalized tonic	9	8.33%
Other characteristics		
Pre-existing epilepsy	33	30.56%
Seizure duration,	17.5 ± 11.7 min	

In present study, atypical febrile seizures (39.81%) was most common etiology noted followed by meningitis (15.74%), cryptogenic (12.96%), hypoglycemia (12.04%) & encephalitis (8.33%). Other causes were head trauma (2.78%), hypocalcemia (2.78%), CNS tuberculosis (1.85%), hypernatremia (1.85%), neurocysticercosis (0.93%) & hyponatremia (0.93%).

Table 2: Etiology

Suspected etiology	No. Of cases	Percentage
Atypical febrile seizures	43	39.81%
Meningitis	17	15.74%
Cryptogenic	14	12.96%
Hypoglycemia	13	12.04%
Encephalitis	9	8.33%
Head trauma	3	2.78%
Hypocalcemia	3	2.78%
CNS tuberculosis	2	1.85%
Hypernatremia	2	1.85%

Neurocysticercosis	1	0.93%
Hyponatremia	1	0.93%

Most patients (60.19%) arrived to our facility within 2 hours of SE onset, 35.19% arrived in 2-4 hours. 5 (4.63%) patients arrived after 4 hours to our facility.

Table 3: Duration of seizures.

Duration from onset of seizures to arrival in hospital	No. of cases	Percentage
< 2 hours	65	60.19%
2-4 hours	38	35.19%
> 4 hours	5	4.63%

In present study, average duration of ICU stay was 3 ± 1.23 days, while average duration of hospital stay was 5.43 ± 2.78 days. Intubation was required in 17 (15.74%) cases, while 13 (16.25%) cases required mechanical ventilation & average duration of mechanical ventilation was 1.24 ± 0.5 days. Refractory status epilepticus was seen in 7 (8.75%) cases, all required general anaesthesia (Thiopentone). Total mortality was 4.63% (5 cases), 3 cases had acute CNS injury & rest 2 had progressive encephalopathy, median survival time was 1.52 ± 0.67 days.

Table 4: Other characteristics

Parameter	Mean \pm SD/ Number of cases (%)
Duration in ICU (no. of days)	3 ± 1.23
Duration of hospital stay (no. of days)	5.43 ± 2.78
Intubation required	17 (15.74%)
Required mechanical ventilation	13 (16.25%)
Length of Mechanical ventilation (day)	1.24 ± 0.5
Refractory status epilepticus (%)	7 (8.75%)
General anaesthesia-Thiopentone required	11 (13.75%)
Mortality	5(4.63%)
Acute CNS injury	3(2.78%)
Progressive encephalopathy	2 (1.85%)
Median survival time (days)	1.52 ± 0.67

Discussion

Status epilepticus is a common pediatric emergency that requires prompt recognition and management. Understanding the clinical profile and factors predicting morbidity and mortality in children with convulsive status epilepticus helps to modulate the management and improve prognosis.

The distribution of etiology for status epilepticus is age dependent in children; febrile or acute symptomatic cause is most common in younger children below 2 years of age; whereas remote symptomatic causes predominate in children above 2 years of age^[6, 7]. Past history of seizures and neurological insult was more common in children with SE aged above 2 years than those below 2 years^[6, 7]. In contrast to developing countries where CNS infections are the predominant cause of SE in children, febrile SE and idiopathic (unknown etiology) cause form the majority in developed countries.⁸

Chinmay C *et al.*,^[9] studied 109 children aged 1 month to 18 years. Presenting with SE, acute symptomatic etiology was identified in 66 (60.6%) cases (CNS infections were predominant). Previous diagnosis of epilepsy was found in 32 (29.4%) children and benzodiazepine responsive SE were seen in 65 (59.6%) children. Predictors of unfavorable outcome were acute symptomatic etiology (adjusted OR 4.50; 95% CI 1.49, 13.62) and no treatment administered prior to hospital (adjusted OR 3.97; 95% CI 1.06, 14.81).

In study by Das K *et al.*,^[10] among 94 cases, majority of children, 60 (63.82%), were < 5 years of age. Prior history of seizures was present in 33 (35.1%) cases, in 14 (42.4%) previous seizure cases, SE was due to drug default. No response to first-line antiepileptic drug (AED) was seen in 84 (89.37%) cases. Acute symptomatic etiology was the commonest etiology of SE in 64 (68%) cases, of which neuro-infections accounted for 44 (46.80%) cases. Longer duration (>60 minutes) of status ($p < 0.01$), ventilator support ($p < 0.0001$), and circulatory impairment ($p < 0.0001$) were attributable risk factors for mortality. A total of 28 children died (mortality rate, 29.8%), and 11 showed the persistence of their neuro-deficit. Longer duration of SE, more lag time for receiving the first AED, respiratory failure, and presence of shock are independent predictors for poor outcome.

Singh and Suryavanshi^[11] study noted that febrile seizures had the best outcome with all patients discharged without any deficits; CNS infections need to be focused more because of the highest morbidity and mortality. Although the immediate outcome in SOL and epilepsy patients seems good in terms of discharge (93% and 84% respectively).

In study by, Ahmad B *et al.*,^[12] MRI was done in fifty patients with 13 patients (26%) showing variable abnormality. The EEG was also done in 50 patients with electrographic seizures in 35 patients (70%). 12 patients (23.5%), 14 patients (27.4%), 12 patients (23.5%), 7 patients (13.7%) and 5 patients (9.8%) responded respectively to the sequential treatments. one patient (1.9%) needed midazolam infusion. There was no neuro-deficit in 36 patients (70.6%), neuro-deficit in 14 patients (26.5%) and mortality in 1 patient (2%). Conclusions: Neuro-imaging and EEG abnormalities are common in children with SE.

Selvan T *et al.*,^[13] studied 66 children, prevalence of status epilepticus was 8.7%. Most common age was found to be 1-3 years (54.5%). Preponderance of male (51.5%) over female (48.5%) was observed. Most common etiology observed was Atypical febrile seizures (33.3%) and meningitis (22.7%). 57.5% children presented as first episode of seizure and duration of seizure was less than 2 hours in 65.1%. Short term mortality rate was found to be 3% and morbidity was found to be 9% and meningitis was responsible for all the deaths. The mortality and morbidity in the form of neurodeficits were observed between the age group of 1 month to 3 years. Based on the duration of seizure lasting more than 8 hours, two third had mortality and one third had morbidity.

Madhu PK¹⁴ studied 87 children between the 1 month to 12 years had convulsive status epilepticus (CSE), median age of CSE was 4 years and 55 (63.2%) were below 5 years of age. Acute symptomatic etiology of CSE was a significant risk factor ($p= 0.03$) for refractory status epilepticus (RSE) which was seen in 31 patients (39%). Acute symptomatic etiology was the cause of CSE in 46 (59.2%) children. Remote symptomatic (26.4%), cryptogenic (18.4%) and progressive (2.3%) were other etiologies. Neuro-infection (29.8%) and febrile seizures (11.5%) were the most common acute symptomatic causes. Mortality and morbidity occurred in 23 (26.4%) and 8 (9.2%) patients respectively. Remaining 56 (64.6%) returned to baseline condition at the end of hospital stay. Longer duration ($p= 0.03$) and acute symptomatic etiology ($p=0.049$) were significant risk factors for mortality.

Prolonged seizures are associated with increased risk of mortality and morbidity^[15]. Unfortunately, due to lack of public awareness, absence of prompt availability of medical care, and lack of infrastructure to transport to appropriate centers there is significant delay in children reaching the tertiary care centers in developing countries^[16]. The cause of SE is the most important factor that determines morbidity and mortality. Failure to treat the underlying cause promptly and correctly will preclude seizure control regardless of which anti-epileptic drug one chooses.

Conclusion

Status epilepticus is a common paediatric emergency where quick identification and proper management is needed. 1-3 years age group, boys & history of status epilepticus, atypical febrile seizures were common risk factors for status epilepticus. The longer the SE is present, more difficult is the control and more is the risk of permanent neurological damage.

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