

A study of clinical profile of status epilepticus in children at a tertiary health care centre

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Abstract

Background: Status epilepticus is a common pediatric emergency greater morbidity and mortality in infants and young children. Immediate intervention to control seizure and associated condition is necessary. The objectives of present study was to study clinical profile of patients with status epilepticus admitted in a tertiary care hospital. **Material and Methods:** Present study was prospective, observational study conducted in children from 1 month to 12 years admitted in the PICU with status epilepticus or developed status epilepticus during the course of their illness. **Results:** Total 80 children were considered for this study. Most common age group was 1-3 years (54%), followed by age group 1 month to 12 months (23%). Among all children boys were 55% and 45% were girls. Atypical febrile seizures was most common cause noted in our study (32.5% patients), followed by meningitis (16.25%), hypoglycemia (12.5%), encephalitis (11.25%). Most patients (61.25%) arrived to our facility within 2 hours of SE onset. 7 (8.75%) patients had refractory status epilepticus, needed further management. 2 (2.5%) deaths were noted during study period. **Conclusion:** Status epilepticus is a common medical emergency in children. Early management is required which includes simultaneous resuscitation and medical stabilization, diagnosis of the underlying cause, and definitive rapid treatment of seizures.

Key Words: Atypical febrile seizures, Meningitis, Status epilepticus

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INTRODUCTION

Status epilepticus is characterized by prolonged or recurrent seizures without a return to baseline. Status epilepticus is a common pediatric neurological emergency with an estimated approximate incidence of 18–23 per 100,000 children per year and a mortality of 2%–7%¹. Previously, status epilepticus has been conceptually defined as “a condition characterized by an epileptic seizure that is sufficiently prolonged or repeated at sufficiently brief intervals so as to produce an

unvarying and enduring epileptic condition”². In 2012 neurocritical care society’s defined status epilepticus as five minutes of continuous clinical or electrographic seizure activity, and it establishes the goal of achieving definitive control of status epilepticus within 60 min of onset³. The 2016 American epilepsy society’s guideline for status epilepticus management follows the five-minute definition without subdividing based on seizure type⁴. Because earlier definition was problematic for clinicians who aimed to aggressively treat status epilepticus earlier before any neuronal injury might occur. Various studies demonstrated that longer seizures predict a longer total duration of status epilepticus and poorer prognosis⁵. Status epilepticus affects people of all ages, though it is more common and causes greater morbidity and mortality in infants and young children⁶. Status epilepticus can clinically manifest as convulsive (tonic clonic, clonic, tonic or myoclonic) or non-convulsive (absence, simple partial, complex partial) seizures. Status epilepticus is more frequent in children than in adults. Status epilepticus occurs in a variety of settings especially in children with infections and patients with previously

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established epilepsy, cerebral malformations, hypoxia, hypoglycemia and head trauma, but in many cases status epilepticus can be the first unprovoked manifestation of a seizure disorder. Age of patient and duration of seizures are major factors in determining outcome of status epilepticus. It has been reported that the mortality is nearly 10-fold higher for seizure lasting 30 min or longer than for those lasting 10–29 min⁷. The longer duration of status epilepticus, more difficult is the control and more is the risk of permanent neurological damage. The short-term mortality (all age groups) rates reported from India and other developing countries range between 10.5% and 28%. Convulsive status epilepticus results in severe neurological or cognitive sequelae in 11–16% of patients⁸. Immediate intervention to control seizure and associated condition is necessary. The objectives of present study were to study clinical profile of patients with status epilepticus admitted in a tertiary care hospital.

MATERIAL AND METHODS

Present study was prospective, observational study conducted in department of paediatrics, Dr Ulhas Patil Medical College and Hospital, Jalgaon. Study duration for this study was of one year. Institutional ethical

committee approval was taken. Written informed consent was taken from guardians before participation in study.

Inclusion criteria

- All children from 1 month to 12 years admitted in the PICU with status epilepticus or developed status epilepticus during the course of their illness.

Exclusion criteria

- Neonatal seizures.
- Age less than 1 month OR more than 12 years.
- Seizures in developmentally abnormal children.

On admission, a detailed history such as present complaints, demographic data, past history of seizures, birth history, developmental history, family history, drug history, immunization status was taken. A 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 and imaging studies were done wherever indicated and results recorded. Records were kept during their stay at hospital with regard to complete recovery, any neurological deficits, morbidity and mortality. All data was collected in pre-designed proforma and analysed accordingly.

RESULTS

After applying inclusion and exclusion criteria total 80 children were considered for this study. Most common age group was 1-3 years (54%), followed by age group 1 month to 12 months (23%). 4-6 years age group children were 9% and 6-12-years age group children were 13% in our study. Among all children boys were 55% and 45% were girls. History of status epilepticus was present in 23.75% patients, while status epilepticus was first manifestation in new epilepsy patients in 76.25% patients.

Table 1: patient characteristics

Characteristic	Number of Cases	Percentage
Age distribution (years)		
1 month to 12 months	16	23
1-3 years	47	54
4-6 years	7	9
6-12 years	10	13
Sex distribution		
Boys	44	55
Girls	36	45
History of status epilepticus		
Present	19	23.75
Absent	61	76.25

Atypical febrile seizures was most common cause noted in our study (32.5% patients), followed by meningitis (16.25%), hypoglycemia (12.5%), encephalitis (11.25%). In 11 children we couldn't make out cause for status epilepticus (13.75%). Less common causes were head trauma (5%), CNS tuberculosis (2.5%), hypocalcemia (2.5%), hypernatremia (1.25%), neurocysticercosis (1.25%), hyponatremia (1.25%).

Table 2: Etiology

Suspected etiology	No. Of cases	Percentage
Atypical febrile seizures	26	32.5
Meningitis	13	16.25
Cryptogenic	11	13.75
Hypoglycemia	10	12.5
Encephalitis	9	11.25
Head trauma	4	5
CNS tuberculosis	2	2.5
Hypocalcemia	2	2.5
Hypernatremia	1	1.25
Neurocysticercosis	1	1.25
Hyponatremia	1	1.25
Total	80	100

Most patients (61.25%) arrived to our facility within 2 hours of SE onset, 27.5% arrived in 2-4 hours. 9 (11.25%) 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	49	61.25
2-4 hours	22	27.5
> 4 hours	9	11.25

Average duration in ICU was 3 ± 1.23 days as noted in our study. Average duration of hospital stay was 5.43 ± 2.78 days. 13 (16.25%) patients required mechanical ventilation during hospital stay. 7 (8.75%) patients had refractory status epilepticus, needed further management. 11 (13.75%) had developed severe sepsis during hospital stay. 2 (2.5 %) deaths were noted during study period with median survival time of 1.52 ± 0.67 days.

Table 4: Other characteristics

Duration in ICU (no. of days)	3 ± 1.23
Duration of hospital stay (no. of days)	5.43 ± 2.78
Required mechanical ventilation	13 (16.25 %)
Refractory status epilepticus (%)	7 (8.75 %)
Severe sepsis	11 (13.75 %)
Mortality	2 (2.5 %)
Median survival time (days)	1.52 ± 0.67

DISCUSSION

Despite significant advances in treatment, SE is still one of the common causes of mortality and neurologic sequelae in infants and children. Some epidemiologic features that are unique to the pediatric population are a relatively higher rate of recurrence of status epilepticus, more frequent with provoking infectious or remote symptomatic causes, and more likely occurrence in children without a diagnosis of epilepsy⁹. We noted most common age group as 1-3 years (54 %), followed by age group 1 month to 12 months (23 %), 4-6 years age group (9 %) and 6-12 years age group (13 %) in our study. The incidence is highest in the neonatal period and declines until approximately five years of age¹. Our findings are similar with this study. Also, they noted that during pediatric lifespan, estimate of the incidence of status epilepticus was between 17 and 23 per 100,000 children¹. Male predominance (55 %) was noted in our study which

is similar to other studies^{10,11}. In our study status epilepticus was first manifestation in new epilepsy patients in 76.25 % patients. Studies reported that, in over 75% of cases status epilepticus may be the first seizure of life, and children presenting with status epilepticus as their first seizure only have a 30% risk of a later diagnosis of epilepsy¹². This finding is similar to present study. The high proportion of acute symptomatic etiology, delayed presentation and poor outcome are the commonly reported findings in other studies¹³. In an Indian pediatric intensive care unit (PICU) study over seven years, 53% had SE as their first seizure and only 60% had received any treatment prior to coming to the PICU¹⁴. 9 (11.25 %) patients arrived after 4 hours to our facility, 6 of them had refractory status epilepticus, required mechanical ventilation. So longer an episode of SE continues, the more refractory to treatment it becomes and the greater is the likelihood of complications. The need for early

treatment, preferably prehospital is clearly noted in other studies also¹⁵. SE in children is commonly due to cryptogenic or remote symptomatic causes in older children, and febrile or acute symptomatic cause in younger children¹⁶. Multiple studies have investigated pediatric status epilepticus etiologies, and febrile status epilepticus is the most common diagnosis^{17,18}. According to etiology, SE can be classified into: 1) Acute symptomatic where an acute medical or neurological illness causes SE; 2) Remote symptomatic where previous illnesses such as encephalopathy, stroke, etc. can cause SE 3) Cryptogenic: cause is unclear but SE is present; and 4) in patients with epilepsy. The identification of these causes is important to the overall therapeutic approach to the child's illness and the formulation of prognosis. The American Academy of Neurology practice parameter addressing the diagnostic assessment of a child with convulsive status epilepticus reported that abnormal results among children who underwent testing included low anti-seizure medication levels (32%), neuroimaging abnormalities (8%), electrolytes (6%), inborn errors of metabolism (4%), ingestion (4%), central nervous system infections (3%), and positive blood cultures (3%)¹⁹. Similar to these studies, we noted atypical febrile seizures as most common cause noted in 32.5 % patients, followed by meningitis (16.25 %), cryptogenic (13.75 %), hypoglycemia (12.5 %), encephalitis (11.25 %). Other less common causes were head trauma (5 %), CNS tuberculosis (2.5 %), hypocalcemia (2.5 %), hypernatremia (1.25 %), neurocysticercosis (1.25 %), hyponatremia (1.25 %). Refractory status epilepticus is characterized by seizures that persist despite treatment with adequate doses of initial anti-seizure medications. 7 patients had refractory status epilepticus, needed further management as ICU admission, mechanical ventilation, paralytic agents. Total 2 deaths were noted in present study, both had refractory seizures. Out of them one was suspected as bacterial meningitis and other was not diagnosed clinically. No immediate neurodeficit was noted among other patients.

CONCLUSION

Status epilepticus is a common medical emergency in children. Early management is required which includes simultaneous resuscitation and medical stabilization, diagnosis of the underlying cause, and definitive rapid treatment of seizures.

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