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Original Research Article

Clinical profile and predictors of immediate outcome in children with status epilepticus

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ABSTRACT

Background: Aim of the study was to study the clinical profile, and predictors of immediate outcome in children aged 1 month to 15 years, with status epilepticus admitted to tertiary care center.
Methods: A prospective study of 43 patients admitted in department of pediatrics in Father Muller medical college between October 2017 to April 2019. They were evaluated for their clinical presentation, treatment profile and immediate outcome.
Results: Twenty-one children (49%) were between 1 to 5 years, seven children (16%) were below 1 year and fifteen (35%) were between 5 to 15 years. Thirty children (70%) were male and thirteen (30%) were female. Twenty-six patients (60.4%) had unprovoked status epilepticus. Twelve children (28%) had pre-existing neurological abnormality. Three patients died (6%) during hospital course and six patients (13.9%) had new onset neurological deficits and rest recovered.
Conclusions: Unprovoked seizures, presence of pre-existing neurological abnormalities, significant birth history, metabolic abnormalities and need for ventilation was associated with new onset neurological deficit and mortality. Overall children with preexisting neurological abnormality presenting with status epilepticus have poorer outcome.

Keywords: Status epilepticus, Clinical profile, Predictors

INTRODUCTION

Status epilepticus is a medical emergency characterized by either rapidly repeating seizures without recovery or regain of consciousness between episodes, or prolonged continuous epileptic activity, both creating a fixed or lasting condition. It is been accepted that the duration of an episode of status epilepticus is 30 minutes or more, a period after which cerebral functioning is highly probable of being affected.[1]

Lately it is becoming increasingly recognized that seizure duration of more than 10 minutes can lead to brain damage and duration of seizure activity in definition of status epilepticus is being lowered. Lowenstein et al described it as a continuous, generalized, convulsive seizure lasting more than 5 minutes, or two or more seizures during which the patients do not return to baseline consciousness.[2]

Status epilepticus is characterized by frequent or severe seizures leading to cerebral dysfunction. This disturbance in cerebral functioning can in turn lead to hindrance in developmental and cognitive aspect of a child in future.

The various studies done on the subject have used different protocols for management and have used varying definitions for status epilepticus. Most of the studies, both Indian and western have been retrospective. Very few studies have been reported which have used the 10-minute cut off for defining status epilepticus. The outcome definition has differed between studies and the

period of follow up has also varied Hence this is an attempt to study the condition using strict definition of status epilepticus and outcome.

The objective of this study was to describe the clinical profile of status epilepticus and to assess the outcome of children with status at discharge.

METHODS

This was an observational longitudinal study, conducted in department of pediatrics, Father Muller medical between October 2017 to April 2019. The study was approved by institutional ethical committee.

According to the following formula sample size was calculated to be 43.

Sample size calculation formula: $n=Z^2_{1-\alpha/2}\times p\ (1-p)/d^2$

Where, n=number, Zα is constant=1.96 at 95% CI (Confidence interval);

d=estimated error, d=0.10

p=0.13 (It is calculated based on incidence of one of the outcomes, which is 13%).[3]

n=43

The sampling technique used was purposive sampling and following inclusion and exclusion criteria were used.

Inclusion criteria

Children in the age group of 1 month to 15 years, continuous seizure lasting for minimum of 10 minutes in the hospital, child brought convulsing to the hospital with parents reporting the duration to be >10 minutes and child brought to the hospital comatose or deeply sedated with eye deviation or minor clonic movements with parent reported tonic clonic seizure having occurred at home and lasting more than 10 minutes.

Exclusion criteria

Age less than 1 month, seizure duration less than 10 minutes and children in whom documentation of seizure is unreliable.

These patients were evaluated for their clinical presentation, treatment profile and immediate outcome at discharge. Data was collected on pre-designed detailed proforma and entered on Microsoft excel spread sheet and analyzed using SPSS software version 20.0. All data was analyzed using frequency and percentage tables. Each variable was compared with outcomes using chi-square test.

RESULTS

There were 43 children with status epilepticus who were admitted from October 2017 to April 2019.

Twenty-one children (49%) were between 1 to 5 years, seven children (16%) were below 1 year and 15 (35%) were between 5 to 15 years (Figure 1).

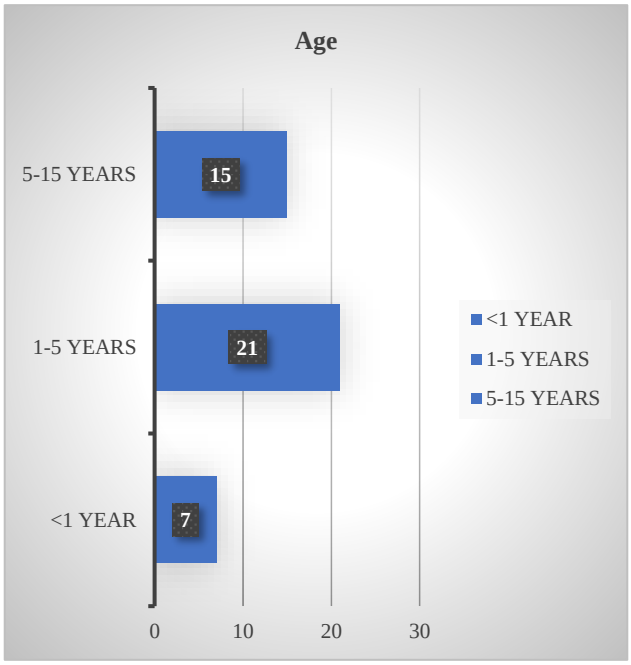

Figure 1: Age of participants.

A total of 30 male children had status epilepticus during this period of study accounting for 70% of the subjects. Male to female ratio was 2.3:1 with a significant male preponderance (Figure 2).

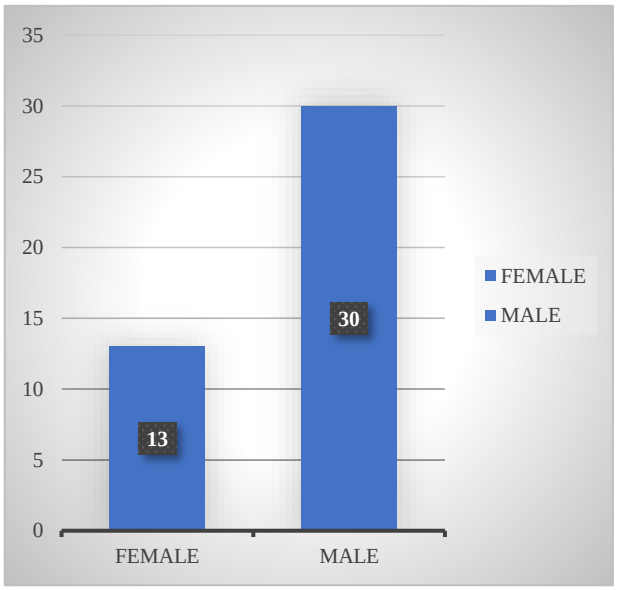

Figure 2: Gender of participants.

Average duration of seizure was 29 minutes before being controlled. Eight children (18%) developed status during hospital stay during evaluation for preexisting neurological deficits (Figure 3).

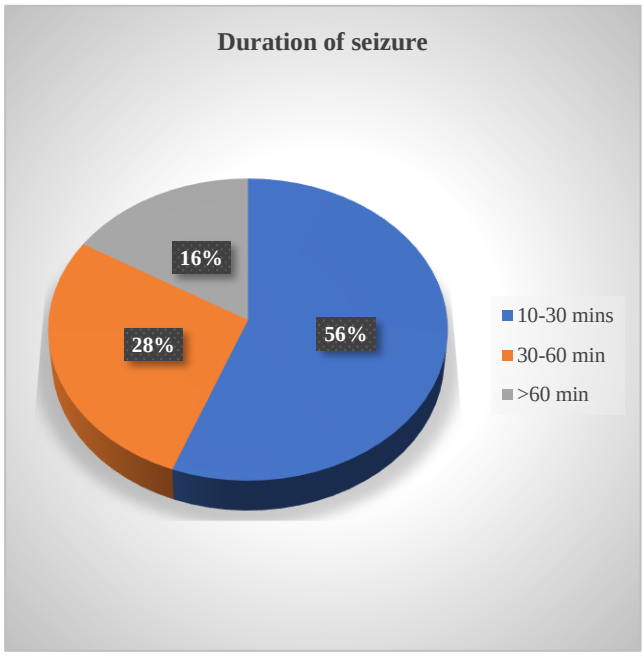

Figure 3: Duration of seizure.

Most common seizure type was generalized tonic clonic seizure (GTCS) in 37 patients. Focal seizures a absence seizures were seen in 3 patients each (Figure 4).

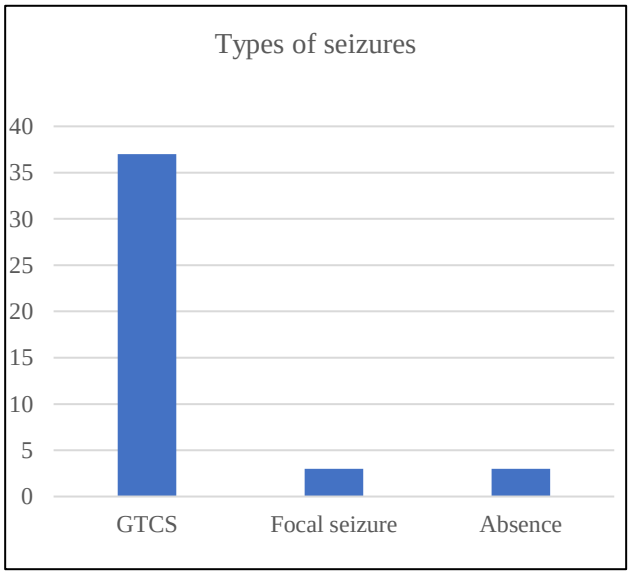

Figure 4: Typers of seizures.

Twelve children (28%) had pre-existing neurological abnormality. Out of this majority were cases with cerebral palsy. Others were a case with intellectual disability, epileptiform encephalopathy and one case with Seckler syndrome (Figure 5).

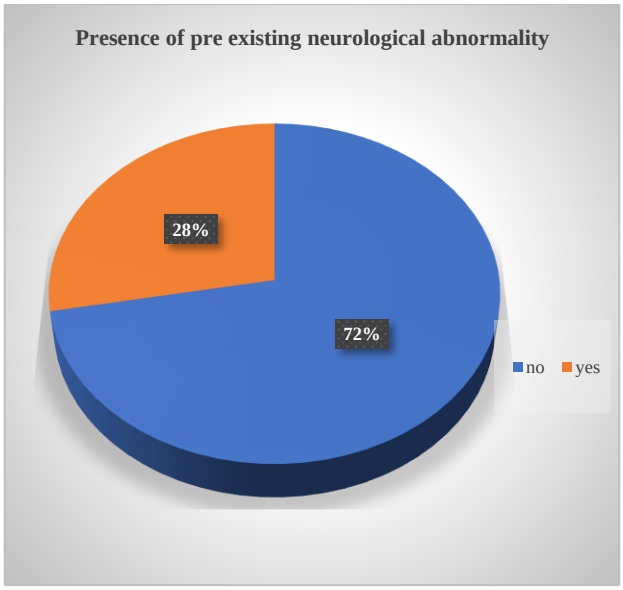

Figure 5: Presence of pre-existing neurological abnormality.

Twenty-four patients with status epilepticus had previous history of seizures.

Among them five had seizure disorder and one had prior episode of febrile seizures. Rest eleven had prior neurological deficits. Among those eleven, two had only global developmental delay, one had intellectual disability and eight had definitive neurological deficits {cerebral palsy (4), hypoxic ischemic encephalopathy (1), mesial temporal lobe sclerosis (1), suspected Fredrich's ataxia (1) and suspected maple syrup urine disease (MSUD) (1)}.

And among the remaining seven cases, after investigations five were diagnosed with underlying causes and two had no cause found.

Rest 19 (44.1%) presented with status epilepticus as first presentation without prior history of seizure disorder.

Predisposing factors for status epilepticus revealed fever in 15 cases and non-compliance to drugs, hypocalcemia and postural hypotension in one case each. In rest 25 cases, the seizures were unprovoked.

Nine patients had received some treatment before coming to this hospital, mostly from other referring hospitals, 6 had received rectal diazepam, 1 injection midazolam, 1 injection lorazepam whereas one was given both levetriacetam and phosphenytoin.

Most commonly used drugs for initial seizure control were midazolam. Two drugs were used for seizure control in 6 cases. Most common drugs used in this scenario was midazolam followed by either levatriacetam or by fosphenytoin. More than 3 drugs were required to control SE in 4 cases.

Magnetic resonance imaging (MRI) was done in 32 patients and was abnormal in 16 (50%). Electro Encephalogram (EEG) done after 48 hours after seizure control, showed abnormal pattern in 88%. Majority of them were generalized inter ictal epileptiform discharges (47%). Only 12 were focal (34%). Only one EEG showed specific pattern suggestive of epileptiform encephalopathy.

Over all immediate outcome revealed 3 deaths (6.9%), 6 (13.9%) patients had new onset neurological deficits and rest recovered (Figure 6).

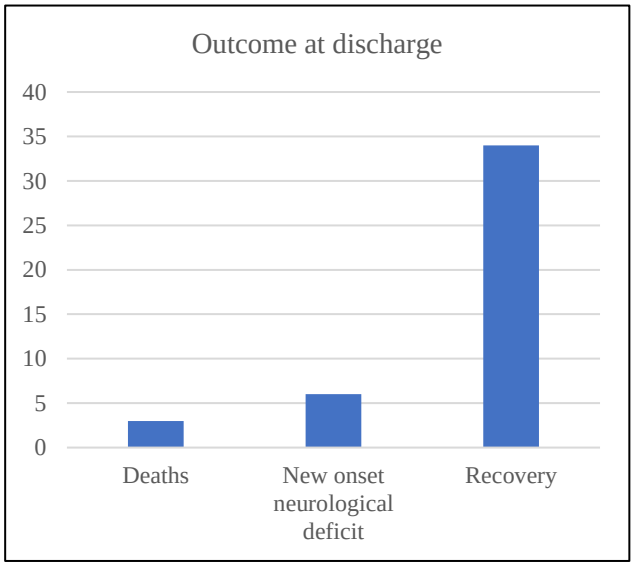

Figure 6: Outcome at discharge.

Of the six cases of new onset neurological deficits, two were the cases of acute demyelinating encephalomyelitis who were previously normal, having new onset ataxia and hypertonia in one case and aphasia in other case. Among the cases with pre-existing neurological abnormalities, a case of sensory neuropathy had new onset ataxia, second case had hearing loss, third case had regression of milestones and the final case had hypertension at discharge.

Out of 3 deaths, one was due to new-onset intra-cranial hemorrhage and one child was a case of metabolic disorder (Suspected MSUD). Only one case died primarily due to status epilepticus, where seizures could not be controlled.

Among the 12 cases with preexisting neurological deficits, four cases (33.3%) had new onset neurological deficits and two cases (16.6%) expired.

After analysis the variables with significant statistical correlation were as shown in Table 1.

Also, the comparison of outcomes in neurologically normal and abnormal children is shown in Figure 7.

Table 1: Predictors with significant correlations.

Predictors	P value
Unprovoked seizures	0.024
History of neurological abnormality	0.014
Previous use of anticonvulsants	0.044
Presence of significant birth history	0.013
Need for ventilation	<0.001
Metabolic abnormalities	0.006

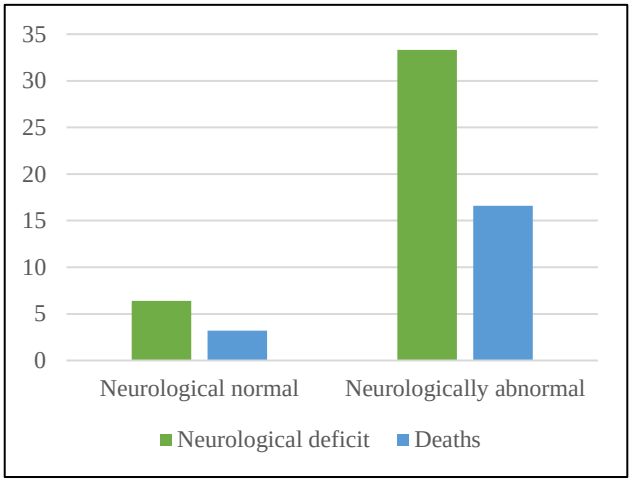

Figure 7: Comparison of outcomes in neurologically normal and abnormal cases.

DISCUSSION

Younger age group is most commonly affected. The 65% of patients were less than 5 years in our study. Gulati et al reported it to be 56%. Similarly, the mean age of presentation was 3.1 years in a study done by Santhanam et al.[4] According to a Japanese study the annual incidence was highest among those below 2 years of age.[5] It may be due to the mechanisms of control of seizure activity in younger are fragile and may get disrupted with minimal abnormalities in neurofunction.

Nineteen (44.1%) presented with status epilepticus as first presentation without prior history of seizure activity. This is almost similar to Gulati who reported it to be at 53.3%. Shinnar and others reported an incidence of 12% of new onset status epilepticus in their study.[6]

There were prior seizures in 55.8% (n=24) of children. Out of them 37% had more than 5 previous episodes. Selvan et al, reported it in 42.5% of children.[7] Statistics were similar in other studies (Santhanam et al 40% and Lorenzo et al 45%).[4,8] The 13 out of those (54%) in our study had history of neurological abnormality.

Hesdorffer et al reported when Status Epilepticus was associated with epilepsy it tended to be the first unprovoked seizure in 30% or it tended to be the seizure leading to diagnosis of epilepsy in 35%. They also reported 18% of unprovoked status epilepticus occurred

in people with established epilepsy. In our study unprovoked seizures were seen in 60% cases. That in comparison is significantly high.[9]

Most common drug used to control seizures was intravenous midazolam. The most important adverse effect of combination therapy was sedation in 90%. There were no events of respiratory depression secondary to it. Chin et al showed that risk of respiratory depression was greater with more than 2 doses of benzodiazepenes.[3] It was similarly echoed by Silbergleit who found that prehospital benzodiazepenes two-fold risk in mortality.[10]

In this study mortality was 6.9%. However, this was lower than all the other reported studies. Mortality in status epilepticus varies from 11%-53%.[11] Significant association of mortality and new onset neurological deficits during the course was seen in those who had unprovoked seizures, with history of neurological abnormality, previous use of anticonvulsants, presence of significant birth history, mechanically ventilated children and who had metabolic abnormalities.

Logroscino et al reported 1% mortality (2/37) in age group 1-19 years.[11] This low mortality rate was similar to our study. But they studied risk factors as a whole but did not analyse risk factors in pediatric age group as it was mainly adult based study. De Lorenzo et al using status epilepticus lasting <1 hour as the reference category, found longer duration to be associated with higher 30-day mortality 30% vs. 2.7% and drug dose required for control of seizures was a risk factor for mortality.[8] Nishiyama et al reports that the main predictors of mortality were aetiology and pre-existing neurologic abnormality. Further predictors of mortality were type of seizures, specific EEG pattern. Whereas age, duration of seizures, treatment and pre-existing epilepsy did not influence the outcome.[5]

CONCLUSION

Unprovoked seizures, presence of pre-existing neurological abnormalities, significant birth history, metabolic abnormalities and need for ventilation was associated with new onset neurological deficit and mortality. Overall children with preexisting neurological abnormality presenting with Status epilepticus have poorer outcome.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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