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OUTCOME AND DETERMINANTS OF OUTCOME OF STATUS EPILEPTICUS AT DISCHARGE IN INDIAN CHILDREN

Mishra Ashwani Kumar*[1] and Srivastava Kavita[2]

[1]Resident, Department of Paediatrics, Bharati Vidyapeeth Deemed University Medical College and Hospital, Pune, Maharashtra.

[2]Associate Professor, Department of Paediatrics, Bharati Vidyapeeth Deemed University Medical College and Hospital, Pune, Maharashtra.

***Corresponding Author: Dr. Mishra Ashwani Kumar**

Resident, Department of Paediatrics, Bharati Vidyapeeth Deemed University Medical College and Hospital, Pune, Maharashtra.

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ABSTRACT

Background: Status epilepticus is a medical emergency that requires rapid and aggressive treatment to prevent systemic complications and neurological damage. Few Indian studies on outcome of pediatric SE are available. **Objective:** To evaluate the outcome and determinants of outcome of status epilepticus in children at discharge. **Materials and methods:** A cross-sectional hospital based study was undertaken of cases with status epilepticus admitted to the pediatric ward or PICU in a tertiary care center between September 2013 to March 2015. They were studied for their demographics, clinical presentation and evaluated with regards to development of epilepsy, focal motor deficit and mortality at discharge. **Results:** Of the 39 subjects enrolled for the study, 5 (12.8%) died. 64% subjects were less than 5 years of age and 61.5% were males. 15.4% had a family history of epilepsy. 25.6% subjects had a seizure duration of > 1 hour. 74% had symptomatic etiology, 10% had idiopathic etiology and for the rest etiology was unknown. All 21 subjects who showed delayed development on admission had poor outcomes. There was a significant positive correlation between (p=0.037) between the presence of prenatal insult either in terms of HIE, hypoglycemia or neonatal seizures and poor outcomes on discharge. **Conclusion:** Children who had prior developmental delay orperinatal insult had significantly worse outcomes in terms of high seizure frequency with moderate to severe cognitive or motor delay.

KEYWORDS: Status epilepticus, outcome, determinants, discharge.

INTRODUCTION

Status epilepticus (SE) is a common medical emergency associated with significant morbidity and mortality. Earlier SE was defined as a continuous seizure lasting >30 min, or two or more seizures without full recovery of consciousness between any of them. Based on recent understanding of the pathophysiology, it is now considered that any seizure that lasts > 5 min probably needs to be treated as SE. [1]The annual incidence of SE in US is 18.3 to 41 per 100 000 population and in Europe, 10.3 to 17.1 per 100 000 population and that of nonconvulsive SE is 2 to 8 per 100 000.[2]Precise epidemiological data for SE are limited for India.

Prolonged SE can lead to cardiac dysrhythmia, metabolic derangements, autonomic dysfunction, neurogenic pulmonary edema, hyperthermia, rhabdomyolysis, and pulmonary aspiration.[3] Permanent neurologic damage can occur with prolonged SE. Mortality from SE varies from 3–50% in different studies.

The first stage of status epilepticus is characterized by generalized convulsive tonic-clonic seizures, associated with an increase in autonomic activity. During this phase cerebral blood flow is increased due to increased cerebral metabolic demands. After approximately 30 min of seizure activity, patients enter the second stage which is characterized by failure of cerebral blood flow auto regulation, decrease in cerebral blood flow, increase in intracranial pressure, and systemic hypotension. During this phase, electromagnetical dissociation may occur in which, although electrical cerebral seizure activity continues, the clinical manifestations may be restricted to minor twitching. [4]

MATERIALS AND METHODS

This was a prospective, cross-sectional, hospital based study that was conducted in the paediatrics department of Bharati Vidyapeeth Deemed University Medical College and Hospital, Pune, India which is a tertiary care centre. The study was conducted during the period September 2013 to March 2015. 39subjects who fulfilled the inclusion criteria were included in the study. All children

in age group of 2 months to 18 years, admitted with status epilepticus in pediatric ward and PICU were included and children whose seizures had already stopped before admission, had central nervous system (CNS) infections or head trauma were excluded.

Data was collected using a structured questionnaire (proforma) which included: age, sex, duration of seizures before and after admission, Anti Epileptic Drugs used i.e. 1st , 2nd, 3rd Line, history of previous seizures, Perinatal/ Developmental/ Family History, Etiology- Idiopathic/Unknown/Symptomatic, outcome on discharge in terms of mortality and morbidity. Data was analysed using SPSS (Statistical Programme for Social Sciences) software 15 version, OpenEpi Software Version 2.3.Frequency tables and graphs were used to present the data.

Prior approval for the study was taken from the Institute Ethics Committee. Written informed consent was obtained from individual subjects with full explanation of the study.

RESULTS

During the study period a total of 39 subjects who fulfilled the criteria were included in the study out of which 5 (12.82%) subjects died in the hospital. The number of subjects with good or bad outcome obtained for each risk factor/parameter studied is shown in the Table 1 along with the p-value for that outcome.

Table 1 Results at a glance

Sr. No.	Risk Factors		Total Patients	Good outcome (16)	Bad outcome (23)	p-value
1.	Age of onset	< 5 years	25	11	14	0.740
		> 5 years	14	5	9	
2.	Gender	Male	24	9	15	0.740
		Female	15	7	8	
3.	Prior development	Delayed	21	0	21	< 0.001
		Not delayed	18	16	2	
4.	Duration of seizures	> 1 hour	10	2	8	0.152
		< 1 hour	29	14	15	
5.	Prior epilepsy	Yes	6	2	4	0.999
		No	33	14	19	
		No	25	13	12	
6.	Neonatal insult	HIE	7	0	7	0.037
		Hypoglycemia	3	0	3	
		Neonatal seizure	24	16	8	
		NICU stay	14	3	11	
7.	Family history	Yes	6	2	4	0.999
		No	33	14	19	
		No	30	12	18	
8.	Status etiology	Idiopathic	4	2	2	0.324
		Symptomatic	29	10	19	
		Unknown	6	4	2	
9.	Number of AED's required to control seizures	≤3	13	4	9	0.495
		>3	26	12	14	
10.	Need for general anesthesia	Yes	1	5	6	0.370
		No	15	18	33	

No significant relation of outcome at discharge was seen with age, gender, duration of seizures, past history, family history, etiology, number of epileptic drugs required to control seizures and need for general anesthesia. There was a significant positive correlation ($p<0.001$) between poor prior development and poor outcome. Similarly, a significant correlation was also observed between the presence of history of perinatal insult and poor outcome($p<0.037$).

DISCUSSION

Age

In the present study, there was no significant correlation ($p=0.740$) between the age of onset of SE with good or bad outcome. Contrary to our results, Maytal et al. [5] conducted a study on 193 children, followed up for a mean of 13.2 months and observed that neurologic sequelae occurred in 29% of infants younger than 1 year of age, 11% of children 1 to 3 years of age, and 6% of children older than 3 years of age. However, Raspall-Chaure et al. [6]postulated that the higher mortality

reported in younger children in some studies may only reflect the higher proportion of acute symptomatic cases in this age group.

Gender

In our study, outcome with respect to gender distribution was not statistically significant. (p=0.740).Contrary to our results, Kumar et al[7]reported that patients with younger age and male sex are slightly more vulnerable to develop SE. Raspall-Chaure et al.[6]too, found that in adults, males are twice as likely as females to have an episode of CSE. They postulated that this gender difference may be partly due to a higher incidence of certain etiologies including cerebrovascular disease and brain trauma in males or it might also reflect a gender difference in seizure threshold or a possible role of hormonal influences in the termination of seizures. [6]

Prior epilepsy

In our study, 15% of patients had prior epilepsy. However, no significant correlation was observed between the presence or absence of prior epilepsy and the outcome of status epilepticus (p=0.999).

Fountain[8] maintains that history of epilepsy is the strongest single risk factor for generalized convulsive status epilepticus and reports that more than 15% of patients who have a history of epilepsy and who present with SE develop epilepsy. Bernard and Wirell[9] reported that in children with no history of seizures preceding status epilepticus, 36 % developed epilepsy and 25% developed refractory epilepsy. 50 percent of children had recurrent status epilepticus.

Developmental status prior to admission

From our study, we report that a significant correlation (p=0.001) exists between delayed developmental status at the time of admission and the poor outcome of SE.

Similar to our study, Martinos et al[10] observed that there was no significant change in neuropsychological status and imaging from base line to 1-year follow-up in 70.4% of subjects aged between 1 and 42 months from a predefined geographic region of North London who had at least one episode of CSE.

Perinatal insults

In our study, there was significant correlation between the presence of neonatal insult and poor outcome of SE. (p=0.037). Spagnoli et al[11]confirmed the evidence that an early insult heightens later susceptibility to seizure-induced brain damage.

Status etiology

In our study, no significant correlation (p= 0.324) was observed between the 3 etiology groups namely idiopathic, symptomatic and unknown etiology and the outcome of SE. However, contrary to our finding, several authors' agree that etiology is the main determinant of morbidity, but different studies reported different etiology groups as predictors of the poor outcome.[12][13][14] Low power of our study could be a reason for not getting a correlation between etiology and outcome.

Duration of seizure

The duration of seizure, either < 1 hour or > 1 hour was not found to have any significant correlation with the outcome of SE in our study. Literature review revealed that a couple of studies [5][15]reported results similar to ours while a few studies[7][8][16] [17] [18] reported that longer duration of seizures resulted in poor outcomes, which is contrary to our finding.

Need for general anesthesia

In our study, there was no significant correlation between the need for administration of general anesthesia and good or bad outcome.(p= 0.370)Contrary to our findings, Kang et al[19] reported that the prolonged use of intravenous anesthesia for the treatment of SE is itself associated with multiple complications, and typically the longer the duration of treatment the lower the likelihood of a good functional recovery. This difference in observation could be attributed to our small sample size and no follow-up study of the cases.

CONCLUSION

There was no significant correlation between age at onset, gender, history of prior epilepsy, family history of epilepsy, number of AED's required to control seizures, duration of seizures and need for general anesthesia and outcome at discharge in terms of developmental, cognitive or motor delay. Children who had prior developmental delay or perinatal insult had significantly worse outcomes in terms of high seizure frequency with moderate to severe cognitive or motor delay.

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