

A Prospective Observational Study on the Clinico-Etiological Profile and Outcome of Children with Status Epilepticus Admitted in the Paediatric Intensive Care Unit of a Tertiary Care Hospital

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Received: 15-06-2023 / Revised: 18-07-2023 / Accepted: 30-08-2023

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Conflict of interest: Nil

Abstract:

Objectives: The aim of the study is to determine the etiological and clinical profile of status epilepticus in a pediatric tertiary care centre.

Methods: This descriptive cross-sectional study was conducted between 2nd August 2021 to 1st August 2022 with 160 children aged 1 year to 12 years. These patients who presented with status epilepticus as a first episode or recurrence were admitted to general paediatric ward and intensive care unit in Patna Medical College and Hospital, Patna.

Results: The majority of subjects (94) were male (58.75%). The majority (82) of children were under 2 years old (51.25 per cent), followed by those aged 5-10 [46 (28.75 per cent)]. The average age was 2.9 years, and the standard deviation was 3.03.

Conclusion: There is no significant relationship between refractory status and a history of birth asphyxia, developmental delay, past or family history of seizures, elevated CRP levels, or aberrant brain imaging. Delay in initiating the first antiepileptic medication was substantially associated with progression to refractory status and subsequent adverse outcomes.

Keywords: Anemia, Antiepileptic, Febrile Status, Meningitis, Mortality.

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Introduction

Status epilepticus (SE) is a critical neurological emergency demanding prompt medical attention and is linked to significant mortality and morbidity [1, 2]. According to a study, the annual occurrence of status epilepticus (SE) in children is shown to range from 10 to 40 cases per 100,000 individuals [3]. Status epilepticus (SE) poses a risk of developing neurologic abnormalities, with an estimated incidence of roughly 14%. The majority of these deficits (12.5%) are attributed to the underlying disease. The occurrence of paediatric status epilepticus is strongly correlated with neurological morbidity. The primary determinant of outcome is the symptomatic aetiology underlying status epilepticus, with the presence of a history of epilepsy playing a secondary role. The role of duration appears to be insignificant [1].

This medical emergency demands aggressive and expeditious treatment. Immediate objectives include stabilisation of the airway, respiration, and circulation, as well as prompt cessation of seizures. Intravenous benzodiazepines - diazepam, midazolam, or lorazepam - and phenytoin are the prescribed first-line drugs for seizure termination.

Diazepam (or midazolam) infusion, thiopental infusion, and propofol infusion are beneficial for the management of Refractory SE (RSE) [4, 5]. Investigations are being conducted into the use of newer medications in SE. Mortality from SE ranges from 3 to 10% in adolescents, while morbidity is twice as high [6]. Mortality and morbidity are greatest with SE associated with CNS infections, the leading cause of SE in the United States [7]. The prognosis is contingent on the underlying aetiology, age, rapidity of SE, and sufficiency of care. Adherence to a time-bound protocol in the emergency room improves patient outcomes [8].

The severity of status cases referred to a tertiary care centre is typically at the extreme end of the spectrum. Consequently, data from admissions to the Paediatric Intensive Care Unit (PICU) for SE may provide insight into the severity determinants of SE and facilitate the development of appropriate strategies to reduce severity [9, 10]. Despite this, investigations on the admission of children with SE to the PICU are uncommon. Less is known about the risk factors associated with refractory status epilepticus (RSE) in minors [11, 12]. In addition,

the majority of RSE data comes from developed nations and epidemiological studies that included all categories of sexually transmitted infections (abortive and refractory) or combined data on adults and children [13, 14]. The purpose of this investigation is to identify the aetiology and clinical profile of status epilepticus in a paediatric tertiary care centre.

Method

This descriptive cross-sectional study was conducted between 2nd August 2021 to 1 August 2022 with 160 children aged 1 year to 12 years. These patients who presented with status epilepticus as a first episode or recurrence were admitted to general paediatric intensive care unit in Patna Medical College and Hospital, Patna.

All children who fulfilled the inclusion criteria were enrolled in the study and parental/guardian consent was obtained. In the case proforma, a comprehensive history and clinical examination

were recorded; pertinent investigations were conducted to arrive at a diagnosis and further treatment was administered; and children were followed to evaluate their immediate outcome. meaning until discharge or demise.

Statistical Analysis

SPSS was used to analyse data inputted in a Microsoft Excel spreadsheet. For nominal data, the Chi-square test and Fischer test were utilised. Less than a 0.05 'P' value is statistically significant.

Results

During the research period, 160 children who met the inclusion criteria were enrolled. The majority of subjects (94) were male (58.75%). The age range examined ranged from 1 year to 12 years (Table 1). The majority (82) of children were under 2 years old (51.25 per cent), followed by those aged 5-10 [46 (28.75 per cent)]. The average age was 2.9 years, and the standard deviation was 3.03.

Table 1: Demographic profile of child and mother

Variable	Frequency	Percentage
Age		
<2 years	82	51.25%
2-5 years	24	15%
5-10 years	46	28.75%
>10 years	8	5%
Gender		
Male	94	58.75%
Female	66	41.25%
Age of mother		
<20 years	14	8.75%
20-24 years	66	41.25%
24-28 years	58	36.25%
28-32 years	18	11.25%
>32 years	4	2.5%
Pregnancy Complications		
PIH	4	2.5%
GDM	4	2.5%
Severe Anaemia	0	-
Bronchial Anaemia	2	1.25%
Hypothyroidism	6	3.75%
Others	0	-
Nil	148	92.5%

The completed investigations are summarised in Table 2. EEG was performed on 48 (30%) of the infants with status. This included all RSE-affected infants. In some instances, EEG was not possible until the patient's status was stabilised. 36 (22.5%) of the infants with an abnormal EEG were

refractory, and the p value was 0.05. Cortical hyperintensities were detected on MRI in 68 children with meningoencephalitis, whereas brain imaging was normal in children with other Central Nervous System (CNS) infections.

Table 2: Investigation profile

Variable	Frequency	Percentage
SEPSIS Screen positive	152	95%
TORCH Screen positive	12	7.5%
Viral Serology positive	20	12.5%

Blood culture positive	18	11.25%
CSF analysis		
Cytology positive	40	25%
Biochemistry positive	48	30%
Culture/Sensitivity positive	4	2.5%
CBNAAT positive for TB	2	1.25%
Imaging study		
USG positive	42	26.25%
USG normal	10	6.25%
CT brain positive	74	46.25%
CT brain normal	58	36.25%
MRI brain positive	68	42.5%
MRI brain normal	14	8.75%
Other special investigation		
EEG positive	36	22.5%
EEG normal	12	7.5%

Discussion

The preponderance (58.75%) of the 160 children with status epilepticus studied were male. The below 2 years age group was found to be the most affected (51.25%), followed by the 5-10 years age group (28.75%). Literature demonstrates that the incidence of convulsive status epilepticus is highest in younger age groups, which may be due to the increased incidence of acute symptomatic causes in very young age groups as well as the vulnerability of the immature brain to seizures [15-17].

This study discovered that the age of children has no bearing on the number of AEDs required to control SE or the number of hospital days. The age at which SE manifests for the first time has no bearing on the number of AEDs required to treat SE or the number of hospital days. There is also no correlation between the age of onset and the recurrence of seizures manifesting as SE after the initial episode. The age of the child at the time of presentation or at the onset has no correlation with the prognosis, severity, or financial burden of SE. Statistically, as the number of AEDs used to treat SE increased, the number of hospital days decreased significantly, reducing the financial burden. Regarding SE, there is no correlation between the socioeconomic status of minors and the duration of their hospitalisation. There is no correlation between the duration or severity of fever and the number of AEDs required to control SE.

Prior pre-hospital resuscitation for SE does not reduce the length of hospital stay, nor does it affect sepsis screen-torch screen viral serology. There is no correlation between ongoing NCSE (at presentation or during resuscitation) and elevated ICP c/f- in the management of SE. There is a statistically significant correlation between a positive TORCH screen and a positive viral serology. However, there is no correlation between a positive TORCH screen and a positive sepsis

screen or blood culture. There is no correlation between a positive sepsis screen, blood culture, and viral serology in the evaluation of SE. None of these, sepsis screening, blood culture, TORCH screening, and viral serology, correlate with the number of AEDs necessary to control SE. Consequently, blood tests should not be used to predict the severity of SE. In my study, the significance of EEG in predicting SE is ambiguous, as it has a positive correlation with MRS but no correlation with GCS. The GCS correlates positively with the number of AEDs necessary to control SE. There is no correlation between the MRS and the number of AEDs needed to control SE.

There are few investigations on the utility of EEG in paediatric SE. There have been reports of EEG abnormalities in 90% of infants presenting with seizures, although these were performed hours to days later [18-20]. The information regarding whether the seizure is focal or generalised is crucial when determining the patient's chronic AED therapy. One-third of children with convulsive seizures who undergo EEG monitoring are reported to have electrographic seizures, and one-third of these children experience only electrographic seizures [21]. In our facility, continuous EEG monitoring was not available.

Conclusion

There is no significant relationship between refractory status and a history of birth asphyxia, developmental delay, past or family history of seizures, elevated CRP levels, or aberrant brain imaging. Delay in initiating the first antiepileptic medication was substantially associated with progression to refractory status and subsequent adverse outcomes. This was primarily due to the length of time it took the patient to reach the nearest medical facility, highlighting the significance of enhancing prehospital care and first aid measures. Anaemia was found to be

substantially associated with refractory status and a risk factor. Six hours after seizure control, an unfavourable outcome was more frequently associated with children who remained pain responsive or unresponsive. This association was statistically significant ($p < 0.01$).

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