



CLINICOETIOLOGICAL PROFILE OF CHILDREN PRESENTING WITH STATUS EPILEPTICUS IN A PAEDIATRIC TERTIARY CARE CENTRE

Paediatric Medicine

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ABSTRACT

Status epilepticus is the most common medical neurologic emergency in childhood. It is a serious and life threatening medical emergency. Etiology and risk factors of status epilepticus are less identified in paediatrics. So, this study was aimed to study clinical profile & risk factor of children presenting with status epilepticus. Also to assess immediate outcome & therapeutic response to treatment. This was cross-sectional study carried out among Children from 1m -14 years of age, who presented to Pediatric Department with Status Epilepticus (SE). About 51% children were aged < 2 years & 59% were male. About 49% were belong to Lower Middle socio-economic class. About 53.75% were of first birth order. About 67.5% were non-consanguineous & 32.5% were observed in Consanguinity. Febrile seizures were the most common diagnosis 35.8% (116), followed by seizure disorders 30.2% (98). Acute CNS infections, encephalopathy and stroke were less frequent. The majority, 71.25% (231) required 2-4 AEDs, while 22.5% (73) needed more than 4 AEDs for effective treatment. Most cases, 91.5% (296) resulted in discharge, while 8.5% (28 cases) led to death. The study conclude that early onset of status epilepticus in children, particularly those from lower socioeconomic backgrounds and with acute symptomatic causes, results in higher rates of morbidity and mortality.

KEYWORDS

Status epilepticus, Neurologic emergency, Children

INTRODUCTION:

Status epilepticus is the most common medical neurologic emergency in childhood. It is a serious and life threatening medical emergency.^[1] Incidence of status epilepticus is estimated to be around 18-28/100000 persons yearly.^[2]

The ILAE has refined the definition of status epilepticus to reflect time at which treatment should be initiated (t1) and time at which continuous seizure activity leads to long term neurological deficits (t2). Status epilepticus is defined as continuous convulsive activity or recurrent generalized convulsive seizure activity without regaining of consciousness (t1=5 min, t2=30 min). For Status epilepticus consisting of focal seizures with impaired awareness (t1=10 min, t2=30 min) and absence status epilepticus (t1=10-15, t2=unknown)^[3]

Acute symptomatic seizure occur due to an acute problem (neurological insult within 1 week) affecting brain excitability such as electrolyte imbalance or hypoglycaemia, toxic metabolic insult including drug withdrawal within 48hrs, intoxication, stroke, malaria, meningitis, encephalitis etc. Remote symptomatic which includes Status epilepticus following a neurological insult more than 1 week prior like post stroke, post traumatic, post encephalitis, Progressive symptomatic are tumours and neurodegenerative diseases. Status epilepticus in defined electroclinical syndromes. Status epilepticus can have devastating consequences like neuronal injuries, decline in cognitive and motor skills and even death.

Approximately 30% of children present with status epilepticus are having their first seizure, 40% of these later develop epilepsy. Febrile status epilepticus is the most common type of status epilepticus in children. Status epilepticus is associated with a mortality of 4-5%, most of which is related to etiology.^[3] Etiology and risk factors of status epilepticus are less identified in paediatrics. So, this study was aimed to study clinical profile & risk factor of children presenting with status epilepticus. Also to assess immediate outcome & therapeutic response to treatment.

Methodology:

This was cross-sectional study carried out among Children from 1m -14 years of age, who presented to Pediatric Department with Status Epilepticus (SE) as first episode and or recurrence during the study period of two years. Total 324 children with SE were enrolled in this study.

All study subjects who fulfil the inclusion criteria were enrolled by the investigator after obtaining informed consent from their legal guardian. A semi-structured tool was used to record the socioeconomic details. Detailed history, clinical examination and investigations (including neuroimaging, biochemistry and pathology investigations as and when needed) are used to determine type of seizure and etiology.

Data was entered systematically in master chart by using MS excel. The data on categorical variables will be presented as n (% of cases) and the values on continuous variables will be presented as Mean ± Standard deviation (SD).

RESULTS:

Total 324 Children from 1m - 14 years of age with Status Epilepticus (SE) were enrolled in this study. About 51% children were aged < 2 years & 59% were male. About 49% were belong to Lower Middle socio-economic class. About 53.75% were of first birth order. About 67.5% were non-consanguineous & 32.5% were observed in Consanguinity. (Table 1)

Table 1: Distribution Of Children According To Clinico-social Profile

Profile	Frequency	Percentage
Age (Years)	<2	165
	2-5	49
	5-10	94
	>10	16
Gender	Male	190
	Female	134
SES	Upper	Nil
	Upper Middle	68
	Lower Middle	159
	Upper Lower	97
	Lower	Nil
Birth Order	1	174
	2	114
	3	24
	>3	12
Consanguinity	Consanguineous	105
	Non consanguineous	219

Table 2: Distribution according to Risk factor

Risk Factor		Frequency	Percentage
Age of onset	<2 Months	36	11.25
	2-6 Months	73	22.5
	6-12 Months	73	22.5
	1-5 Years	61	18.72
	5-10 Years	69	21.25
	>10 Years	12	3.75
Seizure Presentation	GTCS	316	97.5
	Focal Seizures	0	0
	Focal with Secondary GTCS	8	2.5
	Myoclonus	0	0
Number of Recurrence	<2	28	8.75
	2-4	77	23.75
	5-10	44	13.75
	>10	53	16.25
Family History	Yes	36	11.25
	No	288	88.75
NIP Immunization	Appropriate	311	96.25
	Not-appropriate	13	3.75
Delayed Milestone	Appropriate for age	235	72.5
	Delayed	89	27.5
Temperature	Normal	106	32.7
	<100 F	24	7.5
	100-102 F	170	52.5
	103-104 F	24	7.5
Duration of Fever	Normal	104	32.1
	< 2 Days	131	40.4
	2-4 Days	40	12.5
	4-8 Days	45	13.75
	> 8 Days	4	1.25
GCS	< 8	20	6.2
	8-10	40	12.3
	>10	264	81.5
Raised ICP	Yes	38	11.7
	No	286	88.3
Focal Neurological Deficit	Yes	8	2.5
	No	316	97.5
Sensory System	Positive	6	1.9
	Negative	318	98.1
Cerebellar Signs	Positive	8	2.5
	Negative	316	97.5
Clinical meningeal Sign	Yes	58	17.9
	No	266	82.1
Dyselectrolytemia	Yes	239	73.75
	No	85	26.25
EEG	Abnormal	73	22.5
	Normal	24	7.5
CT Findings	Positive	10	23.8
	Negative	32	76.2
MRI Findings	Positive	40	34.5
	Negative	76	65.5
CSF Analysis	Cytology Positive	81	25
	Biochemistry Positive	97	29.9
	C/S Positive	4	1.2
	Viral PCR Positive	11	3.4
	CBNAAT Positive	1	0.3

Table 3: Distribution according to Diagnosis, Therapeutic response & outcome

Therapeutic response & Outcome		Frequency	Percentage
Diagnosis	Seizure Disorder	98	30.2
	Febrile Seizure	116	35.8
	Acute CNS infection	58	17.9
	Encephalopathy	46	14.2
	Stroke	6	1.9
No. doses of AED required	>2	20	6.25
	2-4	231	71.25
	>4	73	22.5

Outcome	Discharged	296	91.5
	Death	28	8.5

A significant portion, 45% (146) had symptoms between 2-6 months and 6-12 months. Generalized tonic-clonic seizures (GTCS) are overwhelmingly the most common presentation, occurring in 97.5% (316). The largest group, 23.75% (77), experienced 2-4 recurrences, while 16.25% (53) had more than 10 recurrences. A positive family history was found in 11.25% (36). The vast majority of children, 96.25% (311), were appropriately immunized according to the National Immunization Program (NIP) schedule. Most children, 72.5% (235), had milestones appropriate for their age. Most cases, 52.5% (170), had temperatures between 100-102°F, while temperatures less than 100°F and between 103-104°F were seen in 7.5% (24) of cases each groups. Fever lasting less than 2 days was the most common, occurring in 40% (131) of cases. Most patients 81.5% (264) had a GCS greater than 10, while 12.3% (40) had scores between 8-10, and 6.2% (20) had a GCS of less than 8. ICP signs were present in 11.7% (38). About 97.5% (316) had focal neurological deficit. Sensory system abnormality were found in only 1.9% (6). Positive cerebellar signs were noted in 2.5% (8). Positive meningeal signs were observed in 17.9% (58). Dyselectrolytemia was observed in 73.75% (239) of cases. About 22.5% shows abnormal EEG. About 23.8% (10) had positive findings on CT scans & positive findings on MRI seen in 34.5% (40 cases). About 25% (81) of the children had a cytology-positive result. (Table 2)

Febrile seizures were the most common diagnosis 35.8% (116), followed by seizure disorders 30.2% (98). Acute CNS infections, encephalopathy and stroke were less frequent. The majority, 71.25% (231) required 2-4 AEDs, while 22.5% (73) needed more than 4 AEDs for effective treatment. Most cases, 91.5% (296) resulted in discharge, while 8.5% (28 cases) led to death. (Table 3)

DISCUSSION:

In present study, Children older than 10 years made up 5% of the total cases. This distribution highlights that the majority of cases were seen in younger children. When compared to other studies, the present findings show a similar findings in study conducted by **S Ramesh et al[4]** In contrast, **T Arun Prakash et al[5]** reported 60% of status epilepticus cases in children below 5 years, which also supports the trend of younger age groups being more affected. In present study, male predominance in seizure occurrence is consistent with findings from several other studies. **S Ramesh et al[4]**, reported a similar trend, showing a male-to-female ratio of 1.3:1, indicating that males are slightly more affected by seizures than females. **T Arun Prakash et al[5]**. Also observed a higher incidence in males (54%) compared to females (46%). In the present study, a significant portion of the cases (49%) were from the lower middle class like in the study conducted by **T Arun Prakash et al[5]**. Highlighted that children from lower socioeconomic strata tend to have higher rates of status epilepticus, likely due to delayed access to medical care and insufficient disease management, both of which are more common in resource-limited environments. **S Ramesh et al[4]**. Also reported a higher incidence of seizures in first-born children, supporting the hypothesis that first-borns may have slightly higher seizure risks due to factors like maternal health during the first pregnancy or heightened parental anxiety. Study by **T Arun Prakash et al[5]**. Report a similar consanguinity rate, emphasizing its role as a risk factor for seizures. The increased genetic homogeneity in consanguineous unions can lead to the expression of recessive genetic mutations, which may predispose children to seizures and other developmental disorders.

In present study, A significant portion, 45% (146) had symptoms between 2-6 months and 6-12 months. Generalized tonic-clonic seizures (GTCS) are overwhelmingly the most common presentation, occurring in 97.5% (316). The largest group, 23.75% (77), experienced 2-4 recurrences, while 16.25% (53) had more than 10 recurrences. A positive family history was found in 11.25% (36). The vast majority of children, 96.25% (311), were appropriately immunized according to the National Immunization Program (NIP) schedule. Most children, 72.5% (235), had milestones appropriate for their age. Most cases, 52.5% (170), had temperatures between 100-102°F, while temperatures less than 100°F and between 103-104°F were seen in 7.5% (24) of cases each groups. Fever lasting less than 2 days was the most common, occurring in 40% (131) of cases. Most patients 81.5% (264) had a GCS greater than 10, while 12.3% (40) had scores between 8-10, and 6.2% (20) had a GCS of less than 8. ICP signs were present in 11.7% (38). About 97.5% (316) had focal neurological deficit. The

study by **S Ramesh et al[4]** & **T Arun Prakash et al[5]** shows similar findings. Reported a high prevalence of first seizures within the first year of life, particularly in relation to febrile seizures and CNS infections. Both of whom reported that GTCS was the most common seizure type. In the present study, 23.75% of children experienced 2-4 recurrences. Recurrence of seizures is a critical concern, as it often indicates underlying chronic conditions. Studies like **KC Sadik et al[6]**. In the present study, 11.25% (36 cases) had a positive family history of seizures. For instance, **S Ramesh et al[4]**. Reported that 15.8% of cases had a positive family history. Similarly, **T Arun Prakash et al[5]**. observed a 26% incidence of family history of seizures.

R Venkateshwaran et al[7] also reported sensory system involvement. The present study's findings align with the general understanding that most pediatric seizures do not significantly affect sensory functions, further indicating the predominance of generalized seizure types in this population. **T Arun Prakash et al[5]**, which also found a low incidence of cerebellar involvement in seizure cases. **R Venkateshwaran et al[7]** also found a low incidence of cerebellar involvement in seizure cases. The low percentage of cerebellar signs in the present study indicates that seizures in this population are predominantly non-cerebellar in origin. Similarly, **KC Sadik et al[6]**. found that CNS infections were a common etiology of status epilepticus, with many cases presenting with meningeal signs. The relatively high percentage of meningeal signs in the present study suggests that CNS infections are a notable cause of seizures, highlighting the need for rapid diagnostic and therapeutic interventions to address infectious causes of seizures. Studies like **S Ramesh et al [4]** and **T Arun Prakash et al[5]**. Similarly identified electrolyte disturbances as significant contributing factors to pediatric seizures. The higher positivity rate in MRI compared to CT could reflect the superior sensitivity of MRI in detecting subtle lesions or abnormalities in specific conditions, particularly within the central nervous system or soft tissues. **T Arun Prakash et al[5]** reported CT scan/MRI brain findings abnormal in (34%) children. the present study's findings regarding CSF analysis underscore the importance of using this diagnostic tool to investigate potential CNS infections, which are a significant cause of pediatric seizures. The comparable results in other studies by **S Ramesh et al[4]**, **KC Sadik et al[6]**, **T Arun Prakash et al[5]** reflect the consistency in using CSF analysis for managing pediatric seizure cases, particularly those complicated by infections or inflammation in the central nervous system. Early detection and treatment of CNS infections through CSF analysis can significantly improve outcomes in children with seizures, as it guides the use of antibiotics, antivirals, or other targeted therapies.

In the present study, febrile seizures were the most common diagnosis, occurring in 35.8%. **KC Sadik et al[6]**. Also reported a high incidence of febrile seizures and CNS infections, reflecting similar etiological patterns across different studies. The slightly lower proportion of febrile seizures in the present study could be attributed to differences in sample population or regional healthcare practices. In the present study, 71.25% (231 cases) of children required 2-4 anti-epileptic drugs (AEDs) to manage seizures. Studies such as **T Arun Prakash et al[5]**. Have shown that 72% of children required two anticonvulsants, while 20% needed more than two, and 8% required three or more AEDs for seizure control. The present study found that 91.5% (296 cases) of children were discharged, while 8.5% (28 cases) resulted in death. This high discharge rate aligns with findings from studies such as **S Ramesh et al[4]**, where most children were treated successfully and discharged. **KC Sadik et al[5]**. Reported a mortality rate of 38% in children with refractory status epilepticus, significantly higher than the present study's 8.5%. This suggests that while most pediatric seizure cases have favourable outcomes, a small proportion, especially those with severe or complicated cases, are at higher risk for mortality.

CONCLUSION:

The study highlights that early onset of status epilepticus in children, particularly those aged <2 years & lower socioeconomic backgrounds and with acute symptomatic causes, results in higher rates of morbidity and mortality. The findings emphasize the importance of early intervention, aggressive seizure management, and improving access to healthcare in vulnerable populations. Addressing risk factors such as neuro-infections and improving maternal and child healthcare, particularly in resource-limited settings, are crucial steps toward reducing the burden of SE. The study recommends better prenatal and early childhood care, particularly in lower-income families, as well as

timely and appropriate use of AEDs to improve outcomes in pediatric SE.

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