

## STATUS EPILEPTICUS: AETIOLOGY AND OUTCOME IN CHILDREN

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**Background:** Convulsing Status Epilepticus (CSE) is a common paediatric emergency especially under 24 months age group. Present study was done to know causes of Status Epilepticus (SE) and outcome during admission and at the time of discharge. **Methods:** A descriptive study in children 2 months to 15 years of age, admitted in Department of Paediatrics, Ayub Medical College, Abbottabad with first status epilepticus, was done to evaluate aetiology, complications and immediate outcome after relevant history, examination, laboratory tests. All information was recorded on Performa designed especially for this purpose. Study was conducted over 2 year period from November 2005 to November 2007. **Results:** Total number of children admitted with SE was 125. Majority of SE episodes were related to acute febrile illnesses. Acute viral encephalitis was the common cause of SE especially in children younger than 24 months followed by febrile convulsions. Fifteen (12%) patients expired while neurological complications secondary to brain injury developed in 10(8%) cases. Mean seizure duration was  $4.92 \pm 9.18$  hours in children with normal outcome,  $5.93 \pm 5.76$  hours in children who died, and  $12.85 \pm 12.91$  hours in children with abnormal neurological outcome at discharge ( $p > 0.05$ ). Correlation between age and duration of seizure was not significant ( $p > 0.05$ ). **Conclusion:** SE is a common paediatric emergency associated with high mortality and morbidity. In young children SE is commonly associated with acute viral encephalitis. Antiviral treatment should be started earlier in this group of young children after history, examination, laboratory tests along with appropriate management of SE. **Keywords:** Status epilepticus, aetiology, outcome, paediatric.

### INTRODUCTION

Convulsive status epilepticus (CSE) is common paediatric emergency. Status epilepticus has been recognized since the 7<sup>th</sup> Century BC.<sup>1</sup> CSE is more common in childhood than adulthood. The cause of SE varies according to the age group. In adults most patients with status epilepticus have seizure disorder<sup>2</sup> whereas fever is a common risk factor in children<sup>3</sup>. Status epilepticus is defined as seizures lasting for >30 minutes. Seizures lasting longer than 30 minutes can cause brain injury.<sup>4</sup> A patient with status epilepticus has either continuous or repeating seizures without gaining consciousness in between. At onset it may be partial or generalized.<sup>2</sup> Generalized status epilepticus is the most dramatic and dangerous type of SE.<sup>2</sup> Generalized SE may be life threatening to the patient and challenge for paediatrician. Overall incidence is higher in first year of life. Different range of factors can cause CSE but aetiology varies with patient's age.<sup>5</sup> Some children have neurological abnormalities or previous history of epilepsy, however febrile status epilepticus is the single most common cause.<sup>6</sup> In neurologically abnormal children risk of recurrent status epilepticus is increased. SE can be the initial presentation of epilepsy; though many patients with epilepsy can develop SE at some point in their lifetime.<sup>2</sup> A seizure can be the first indication of central nervous system complication, mandating its rapid etiologic diagnosis.<sup>1</sup>

CSE can be associated with high morbidity and mortality.<sup>7</sup> Different factors may be responsible for adverse outcome associated with CSE. The

outcome is influenced by aetiology and duration of SE.<sup>8</sup> Age factor has role in outcome along with aetiology and duration. The risk of sequelae in unprovoked and febrile CSE is low, though some evidence suggest role of febrile CSE in causation of hippocampal injury.<sup>9</sup> Paediatric patients who have normal neurodevelopmental status have favourable outcome after CSE in the absence of other risk factors like intracranial infections.

Present study was conducted to find aetiology of status epilepticus and immediate outcome during hospital stay and at the time of discharge in children less than fifteen years old admitted in department of paediatrics.

### MATERIAL AND METHODS

This was a descriptive study conducted in Department of Paediatrics, Ayub Medical College, Abbottabad from November 2005 to November 2007. All children presenting with continuous fits of more than 30 minutes duration or intermittent fits of more than 30 minutes duration without gain of consciousness in between and less than sixteen years old were included in this study. Children with first episode of status epilepticus were included. Cases presenting with recurrent status epilepticus were excluded as well as children older than 15 years. After stabilizing vitals detail history and examination were conducted. At admission blood pressure, fundoscopy and signs of meningeal irritation were especially checked. Investigations

included full blood count, blood sugar, serum calcium, serum electrolytes, anti-streptolysine-O titres, blood urea, serum creatinine, urine examination, lumbar puncture and CT-scan skull (where indicated). All information was recorded on specially prepared performa designed for this study. During admission patient were closely monitored for any complication. At the time of discharge patients were evaluated clinically to detect any neurological abnormality. SPSS 16 was used for data processing.

**RESULTS**

One hundred and twenty five patients with SE were admitted in two years. 68% were male and 32% were female. Children age less than two years were 46.4%, 26.4% of cases were more than 2 years to 6 years of age, 16% were from 6 to 10 years, and 11.2% were from 11years to 15 years. Acute viral encephalitis was the underlying aetiology in 40 (32%) cases. In 38 (30.4%) of cases status epilepticus was initial presentation of febrile convulsions. Aetiology in rest of the children included seizure disorder 18 (14.4%), cerebral palsy 8 (6.4%), hypertensive encephalopathy secondary to acute glomerulonephritis 6 (4.8%), acute bacterial meningitis 4 (3.2%), tuberculous meningitis (TBM) 3 (2.4%), pertussis 2 (1.6%), and one case (0.8%) each of sepsis, diabetic keto-acidosis, chronic renal failure, head injury, hypoglycaemia and hypocalcaemia was documented. Duration of fits was less than one hour in 21 (16.8%), 2–6 hours in 70 (56%), 7–24 hours in 30 (24%), and more than 24 hours in 4 (3.2%). Fifteen (12%) patients expired while 10 (8%) experienced adverse neurological outcome as determined on hospital discharge. Mean seizure duration was 4.92±9.18 hours in children with normal outcome, 5.93±5.76 hours in children who died, and 12.85±12.91 hours in children with abnormal neurological outcome at discharge ( $p>0.05$ ). No significant correlation was found between age and duration of seizures ( $p>0.05$ ).

**Table-1: Distributions of status epilepticus in different age groups**

Age group	Number of cases
2–24 months	58 (46%)
25–60 months	33 (26.4%)
61–120 months	20 (16%)
>120 months	14 (11.2%)

**Table-2: Duration of status epilepticus**

Duration of convulsions	Number of cases
2–6 hours	70 (56%)
7–24 hours	30 (24%)
>24 hours	4 (3.2%)
<1 hour	21 (16.8%)

**Table-3: Aetiology of status epilepticus in different age groups**

Diagnosis	<2 years	3-5 years	6-10 years	11-15 years	Total
Viral encephalitis	21	5	9	5	40
Febrile convulsions	23	13	2	0	38
Epilepsy	4	4	5	5	18
Acute glomerulonephritis	0	0	3	3	6
Cerebral palsy	3	5	0	0	8
Acute bacterial meningitis	2	2	0	0	4
Tuberculous meningitis	0	1	1	1	3
Whooping cough	1	1	0	0	2
Hypoglycemia	1	0	0	0	1
Hypocalcaemia	1	0	0	0	1
Sepsis	1	0	0	0	1
Diabetic Ketoacidosis	0	0	1	0	1
Chronic renal failure	0	1	0	0	1
Head injury	0	1	0	0	1
Total	57	33	21	14	125

**DISCUSSION**

Status epilepticus is common in infancy and childhood. Present study included 125 children 2 months to 15 years of age admitted during two years time period in Department of pediatrics with first episode of status epilepticus. Eighty-five (68%) were males and 40 (32%) were female. In study by Hussain N *et al*, 137 (54%) children were male<sup>10</sup>, while in other studies clear sexual predominance has not been found.<sup>3</sup> Acute febrile illnesses and infections are common precipitating causes in children<sup>6</sup>. SE is a common presentation of encephalitis.<sup>12</sup> Intracranial infections were the most common cause of status epilepticus in present study; occurring in 44 (35.20%) patients. Acute viral encephalitis (32%) was more common than acute bacterial meningitis (3.2%) (Table-3). Parson *et al*<sup>7</sup> have also reported similar results. Furthermore acute viral encephalitis was far more common in age group less than 24 months than older children. Out of 40 cases 21 (52.50 %) cases of viral encephalitis were below 24 months. Chin *et al*<sup>13</sup> have described acute bacterial meningitis (ABM) as a common cause of CSE with fever, in present study ABM was diagnosed in only 3.2% cases with CSE and fever. In 3 (2.4%) cases of SE the underlying aetiology was tuberculous meningitis. SE can occur in patients with established epilepsy in the setting of acute illness<sup>14</sup> or non-compliance of anti-epileptic drugs. In present study 18 (14.4%) cases with SE had idiopathic epilepsy. Acute febrile illness and poor drug compliance were responsible for precipitation of SE in these cases. SE in established cases of epilepsy occurred mainly in older children while intracranial infections precipitated SE in younger age group. Out of 18 (14.4%) patients with epilepsy only 4 (3.2%) patients were younger than 24 months. 8 (6.4) children with cerebral palsy presented with SE, all below

60 months age. Children with acute glomerulonephritis can present with seizures and altered mentation.<sup>15</sup> In present study 5 (4%) children more than five years age with acute glomerulonephritis presented with status epilepticus. Apart from central nervous system infections other acute processes causing SE include electrolytes abnormalities, renal failure, sepsis, head trauma.<sup>16</sup> In this study 1 (0.8%) case each of renal failure, sepsis, hypoglycaemia, hypocalcaemia, diabetic ketoacidosis, head trauma, pertussis and pertussis vaccine were the aetiology of SE. Aetiology is the predominant factor-affecting outcome in addition to age of the patient and duration of convulsions in cases of SE.<sup>4,6,16</sup> The occurrence of status epilepticus is indicator of severity of the illness.<sup>17</sup> The morbidity and mortality of SE has declined in recent years due to advances in treatment<sup>14</sup>. The favourable outcome of SE in children may also be related to the resistance of the immature brain to damage from seizures.<sup>14</sup> In present study 15 (12%) patients expired, 10 (66.66%) patients had intracranial infections. All expiries were under age 5 years. In other studies mortality was reported to be 6.2%.<sup>6,18</sup> High mortality in present study is related to increased number of presumed viral encephalitis particularly in age group less than 2 years age causing acute insult to central nervous system. The average duration of SE was 5.93±5.76 hours in patients who expired ( $p>0.05$ ) and 4.92±9.12 hours in children with normal outcome. In study by Parson SJ<sup>7</sup> mean seizure duration was 6.8 ±12 hours in children who died ( $p<0.05$ ) and 1.5±2.8 hours in children with normal outcome after status epilepticus.

Complications during admission and at discharge were noted in 10 (8%) cases. All the cases except one (TBM) with complications suffered acute viral encephalitis. 6 (60%) cases with complications were less than 19 months age. Mean duration of convulsions was 12.85±12.91 hours in children with complications ( $p>0.05$ ). In study by Parson SJ<sup>7</sup> mean duration of seizures was 1.7±1.2 hours in children having abnormal neurological outcome after SE ( $p>0.05$ ). Aetiology was presumed acute viral encephalitis in 90% of children with complications. So complications mainly occurred in younger group of children with acute cerebral insult. Maytal *et al* have reported high incidence of neurological sequelae in 29% of infants fewer than 12 months age due to the greater incidence of acute neurological disease in young age group.<sup>19</sup> Acute neurological complications included monoparesis, hemiparesis, loss of vision and brain damage in present study. Seven patients sustained brain damage and were unconscious at the time of discharge from the hospital.

## CONCLUSION

Status epilepticus is common emergency in children especially younger than 24 months. Acute brain insult in the form of intracranial infections particularly viral encephalitis is a common trigger for SE. Morbidity and mortality are more common in children less than 24 months and in the presence of acute intracranial infections. In younger patients with status epilepticus treatment for presumed viral encephalitis should be initiated in addition to vigorous management of SE.

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