

A study of clinical profile and outcome of children who presented with status epilepticus in the PICU of a tertiary care hospital of central India

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Abstract

Background: Status epilepticus is an acute, life threatening neurological emergency that may lead to permanent neurological damage or even death. Status epilepticus affects people of all ages, though it is more common and causes greater morbidity and mortality in infants and 1-5 yr age. **Method:** The Present study was conducted in the Department of Pediatrics tertiary care hospital. A total of 105 children were studied. All the children aged between 1 month - 14 year presenting with Status Epilepticus, admitted in PICU in department of pediatrics. Data was collected after taking written consent, detailed history in a pretested proforma. **Results:** Total 105 subjects were included in final analysis out of which 55(52.4%) were male and 50(47.6%) female. Subjects had duration of seizure more than 30 minute at presentation. In our study showed that factors associated with a high risk of mortality in status epilepticus are GI hemorrhage (p value <0.001), significant mortality was observed in subjects who required MV on admission (p value < 0.0001), hypotension (p-value 0.0003), prolonged duration of seizures (p-value 0.015), time taken to control seizures (p-value <0.0001), nutritional status (p value 0.008), infectious etiology (p value 0.0006) and distribution of subjects according to socioeconomic status and outcome also statically significant (p-value <0.0001), 100% mortality was in super refractory group and 6(60%) mortality was seen in subjects who had not controlled seizure within 24 hour. **Conclusion:** In this study mortality was associated, risk factors being prolonged duration of seizures, infectious etiology, hypotension, Gastrointestinal hemorrhage and need for mechanical ventilation on admission. Prolong duration of seizures and not respond to AED were major contributing factors.

Keywords: Gastrointestinal hemorrhage, Hypotension, mechanical ventilation

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Introduction

Status epilepticus is an acute, life threatening neurological emergency that may lead to permanent neurological damage or even death. It poses a therapeutic challenge to the treating physician. It is more frequent in children, following acute neuroinfections, dysmetabolic states, hypoxia, brain damage and sudden withdrawal of antiepileptic drugs. It is estimated that 1.3% to 16% of all patients with epilepsy will develop SE at some point their lives[1]. The management of a patient with SE requires early recognition, timely intervention and a series of important decisions based on an accurate clinical assessment[2,3]. Status Epilepticus is a condition resulting either from the failure of the mechanisms responsible for seizure termination or from the initiation of mechanisms which lead to abnormally prolonged seizures (after time point t1). It is a condition that can have long-term consequences (after time point t2), including, neuronal injury, alteration of neuronal networks, and neuronal death depending on the type and duration of seizures[4].

The incidence of childhood convulsive SE (CSE) in developed

countries is approximately 20/100,000/year but it varies according to socioeconomic and ethnic characteristics of the population[5]. Duration of SE is a major determinant of response to antiepileptics and its final neurological outcome. It has been reported that the mortality is nearly 10-fold higher for seizure lasting 30 min or longer than for those lasting 10–29 min[6]. The early recognition and rapid termination of seizures is important during acute illness[7,8,9]. The longer the duration of SE, more difficult is the control and more is the risk of permanent neurological damage. Immediate intervention is important whenever the patient has SE[10]. Generalised tonic-clonic seizure is most common type presented with status epilepticus. The ILAE defines SE as “a seizure that shows no clinical signs of arresting after a duration encompassing the great majority of seizures of that type in most patients or recurrent seizures without interictal resumption of baseline central nervous system function[11,12]. Age is a main determinant of the epidemiology of SE and even within the pediatric population there are substantial differences between older and younger children in terms of incidence, etiology, and frequency of SE[4]. SE is commonly due to cryptogenic or remote symptomatic causes in older children, and febrile or acute symptomatic causes in younger children[13].

SE can clinically manifest as convulsive (tonic clonic, clonic, tonic or myoclonic) or non convulsive (absence, simple partial, complex partial) seizures. The failure to diagnose status epilepticus leads to high mortality. Outcome of SE in children is favorable in most cases,

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but mortality and morbidity rates are still high. Mortality is particularly high in central nervous system infection and acute brain injury. Morbidity secondary to childhood SE, includes the development of focal neurological deficits, cognitive impairment and behavioural problems.

We planned the study to analyze demographic profile, incidence, etiology, short term and long term outcome as mortality in children presenting with status epilepticus, admitted in PICU.

Material & methods

The Present study was conducted in the Department of Pediatrics tertiary care Hospital. A total of 105 children were studied. All the children aged between 1 month to 14 years years presenting with Status Epilepticus, admitted in PICU in department of pediatrics,

Study design

This study was a prospective observational study.

Inclusion criteria

Child 1 month - 14 year presenting with SE, admitted in PICU

Exclusion criteria

- Patient whose parents didn't give consent.

- Patients already treated in other hospital as status epilepticus then referred to Hospital
- Children admitted for other complaints and developing status epilepticus during the course of their illness.

Statistics

A total of 105 children were studied. Codes were prepared for each options of the questionnaire. Data was entered in excel sheet to prepare a master chart **Chi square test** was used to find out factors status epilepticus.

Ethics

The study was approved by the Institutional Ethics Committee

Results

A total of 105 children were studied. All the children aged between 1 month to 14 years years presenting with Status Epilepticus, admitted in PICU in department of pediatrics. Maximum Subjects were in age group 1-5 year ie. 72 (68.57%), followed by in age group >5-14 year were ie. 21(20%), and in age group 1month <12 month were 12 (11.4%). This **table 1, Graph 1** is showing distribution of subjects according to Socio economic status and their outcome.

Table no: 1 Distribution of subjects according to socio economic status and their outcome

Socio Economic Correlation	Outcome	
	Survived	Death
Lower(n=51)	34 (66.66%)	17 (33.33%)
Lower middle(n=37)	35 (94.59%)	2 (5.40%)
Middle(n=17)	16 (94.11%)	1 (5.88%)

p-value <0.0001

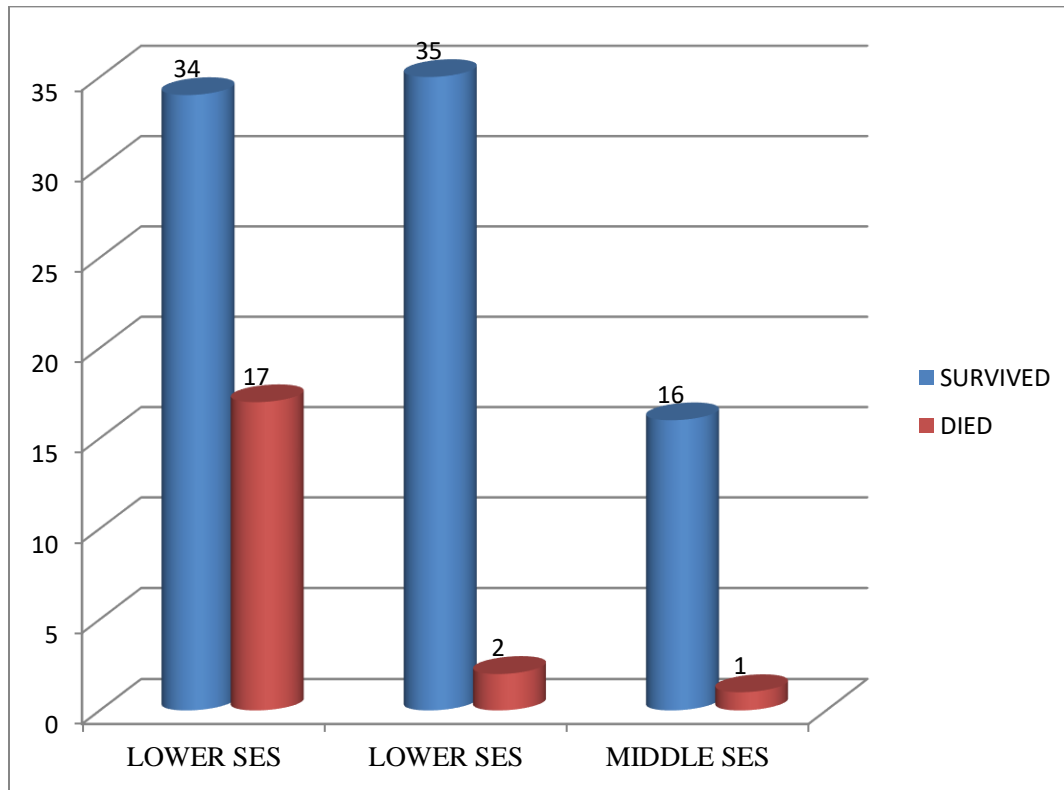


Fig 1 Distribution of subjects according to socio economic status and their outcome

Among 51 subjects,34(66.66%) subjects in Lower SES were survived and 17(33.33%) died. Among 37 subjects,35(94.59%) subjects in Lower middle SES were survived and 2(5.40%) died. Among 17subjects, 16(94.11%) subjects in middle SES were survived and 1(5.88%) died. Mortality was constantly highest in lower SES group and it was is highly statically significant p-value <0.0001. This **table 2, Graph 2** is showing distribution of subjects according to duration of seizures and their outcome.

Table 2 :Distribution Of Subjects According To Nutritional Status And Their Outcome

Nutritional Status[52]	Outcome	
	Survived	Death
Wt/ht< -3 SD(n=23)	13 (56.52%)	10 (43.47%)
Wt/ht-3 to -2 SD (n=33)	28 (84.84%)	5 (15.16%)
Wt/ht>-2 to +2SD (n=29)	29 (100%)	0 (0.00%)
BMI<15 (n=9)	4 (44.44%)	5 (55.55%)
BMI 15-24 (n=11)	11 (100%)	0 (0.00%)

p-value <0.0001

- Mortality was high in severely undernourished subjects. It was statically highly significant.

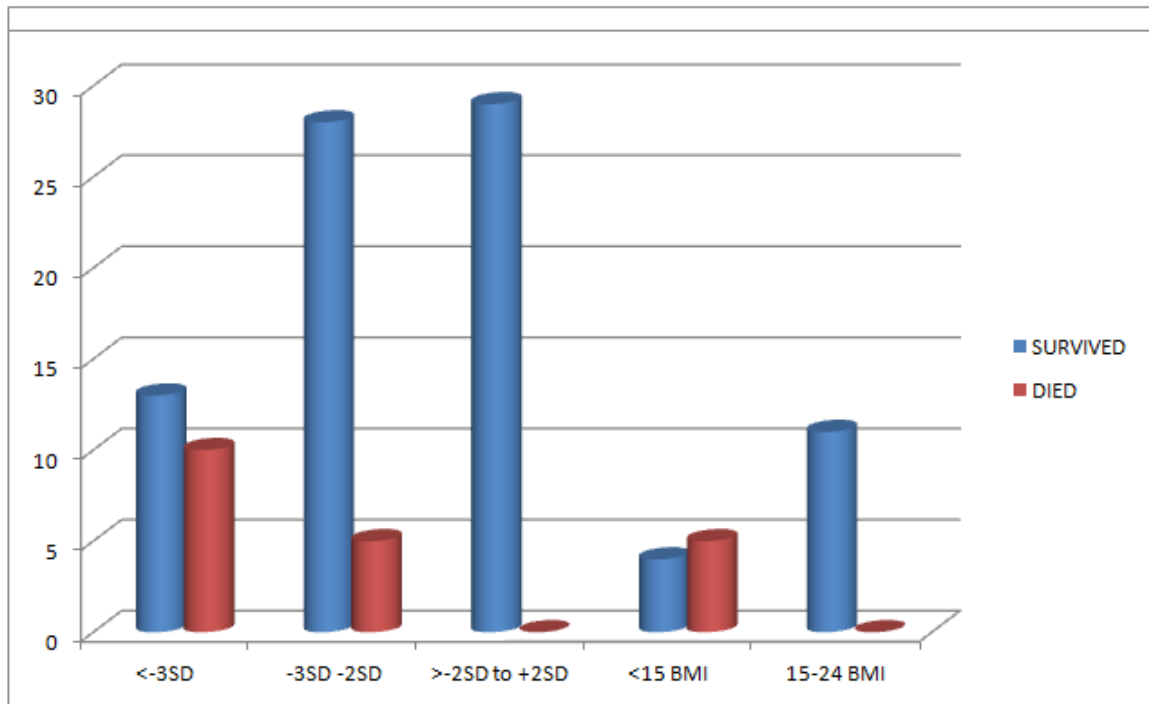


Fig 2 Distribution of subjects according to nutritional status and their outcome

Among 62 subjects, who presented with >30-60min duration of seizures 45(72.58%) subjects were survived and 17(27.41%) died. Among 38 subjects, who presented with>5-30min duration of seizures 36(94.73%) subjects survived and 2(5.26%) died. Among 5 subjects, who presented with >60 min duration of seizures 4(80%) were survived and1 (20.0%) died. Maximum mortality was seen in subjects presented with duration of seizures>30 minutes. It was statically highly significant p-value <0.023. **Table 3, Graph 3** is showing distribution of subjects according to nutritional status and their outcome.

Table 3:Distribution of subjects according to blood pressure on admission and their outcome

Blood Pressure On Admission	Outcome	
	Survived	Death
Normal blood pressure (n=92)	80 (86.95%)	12 (13.04%)
Hypotension (n=13)	5 (38.46%)	8 (61.54%)

p-value <0.0001.

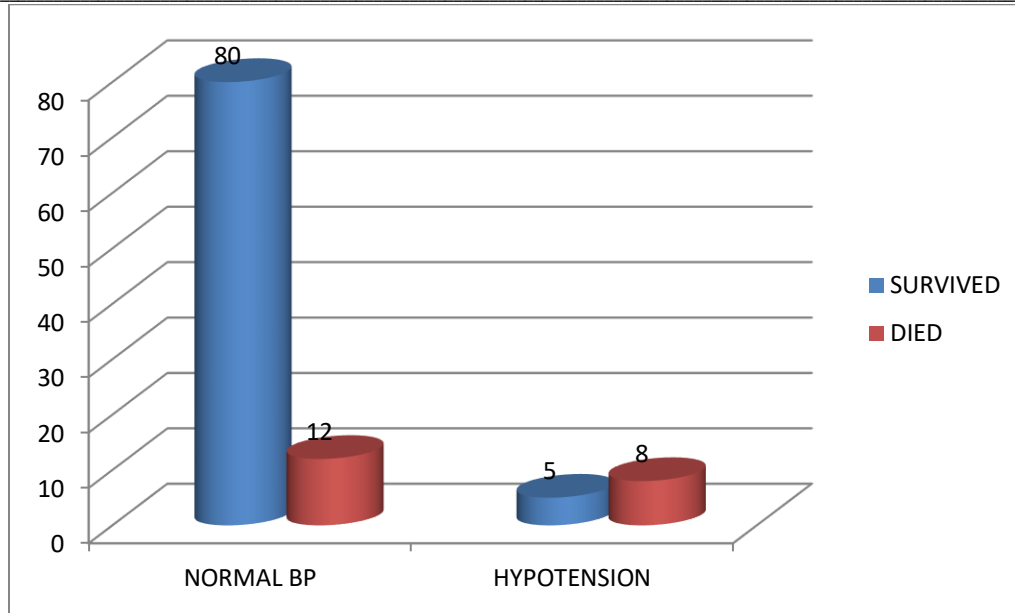


Fig 3: Distribution of subjects according to blood pressure on admission and their outcome

Among 23 subjects Wt/ht < -3SD (SAM) 13 (56.52%) survived and 10 (43.47%) died. Among 33 subjects Wt/ht -3 to -2 SD (MAM) 28 (84.84%) survived, and 5 (15.16%) died. Among Wt/ht > -2 SD to +2SD and BMI = 15-24 group of subjects had 100% survival. Among 9 subjects BMI < 15 4 (44.44%) (CED) survived and 5 (55.55%) died, p-value < 0.0001. This table 3, Graph 3 is showing distribution of subjects according to blood pressure on admission and their outcome. Mortality was higher in subjects who presented with hypotension which is statically highly significant p-value < 0.0001. This table 4, Graph 4 is showing distribution of subjects according to GIH present at time of admission and their outcome

Table no:4 Distribution of subjects according to gi h and their outcome

GIH	Outcome	
	Survived	Death
GIH PRESENT (n=38)	20 (52.63%)	18 (47.37%)
GIH ABSENT (n=67)	65 (97.01%)	2 (2.99%)

p-value - < 0.0001 GIH = gastrointestinal hemorrhage

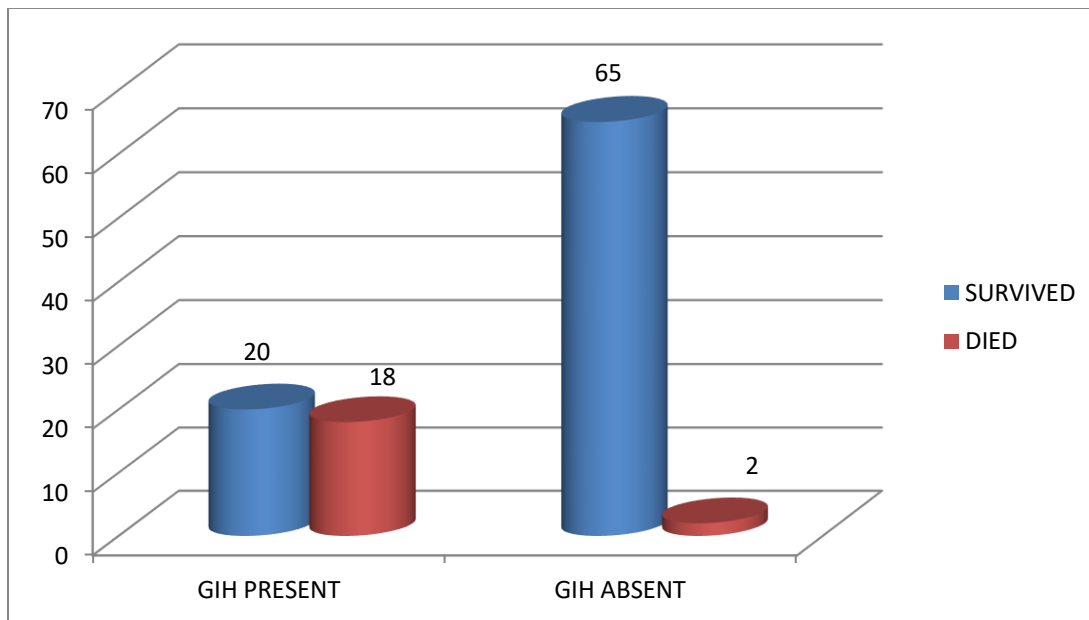


Fig 4: Distribution of subjects according to GIH and their outcome

Mortality was very high in GIH group and it was statically highly significant <0.0001. **Table 5, Graph 5** is showing distribution of subjects according to their outcome.

Table no: 5 Distribution of subjects according to mechanical ventilation requirement on admission and their outcome

Mechanical Ventilation requirement	Outcome	
	Survived	Death
Required (n=23)	6 (26.09%)	17 (73.91%)
Not Required (n=82)	79 (96.34%)	3 (3.66%)

p-value<0.0001, which is highly significant

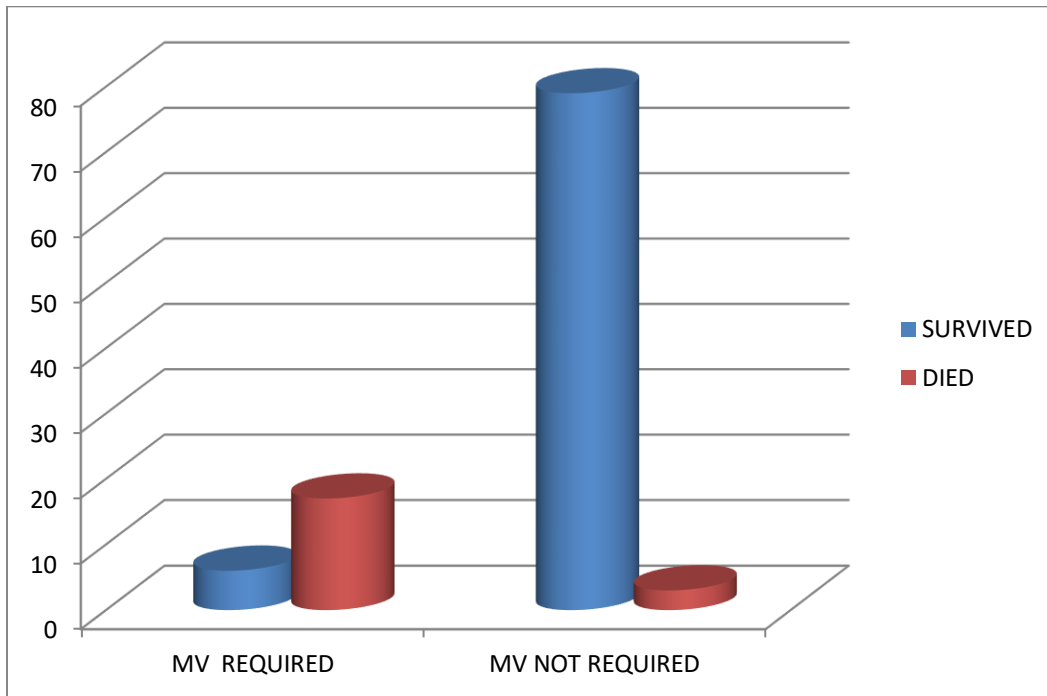


Fig 5 Distribution of subjects according to mechanical ventilation requirement on admission and their outcome

Among out of 23 subjects, required MV6(26.09%) were survived ,while 73.91%(17) died. Among out of 82 subjects, who did not require MV on admission 79(96.34%) were survived, while 3.66% (3) subjects did not required MV on admission but later on required died, p-value<0.0001, which is highly significant. **Table 6, Graph 6** is showing distribution of subjects according to time taken to control seizures after started AED and their outcome

Table 6 Distribution of subjects according to time taken to control seizures after started AED and their outcome

Time Taken To Control Seizures	Outcome	
	Survived	Death
0-5 min(n=1)	1 (100%)	0 (0.00%)
>5-30 min(n=38)	35 (92.10%)	3 (7.90%)
>30-60 min(n=47)	45 (95.75%)	2 (4.25%)
1-24 hours(n=10)	4 (40%)	6 (60%)
>24 hours(n=9)	0 (0.00%)	9 (100%)

p-value – 0.0001.

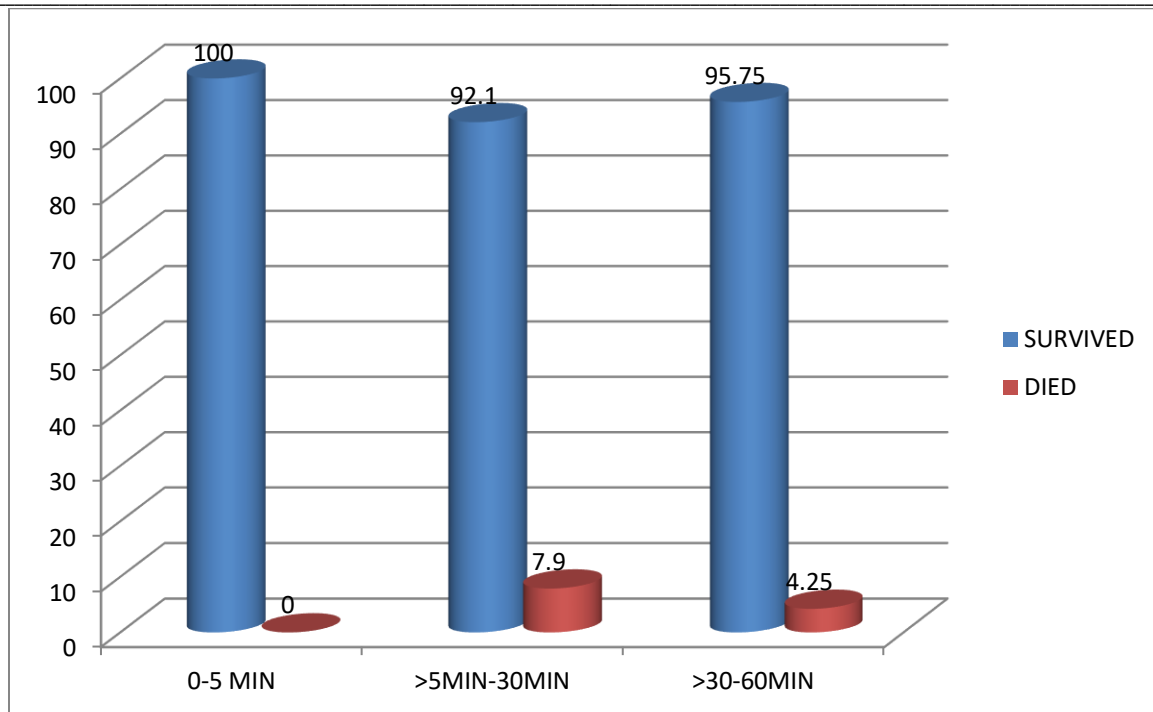


Fig 6 Distribution of subjects according to time taken to control seizures after started aed and their outcome

Mortality was if the time taken to control seizure, p -value<0.0001, which is highly significant.

Discussion

Our study was conducted in department of pediatrics PICU, in which 105 subjects were included observed that in our study, most affected age group was 1-5 years 72(68.5) subjects, followed by 21(20%) subjects were in 5-14 year age group and 12 (11.4%) subjects in 1- <12 months age group .Similar study done by Das N K et al, found that the incidence of SE was maximum in age group of <5 years (80%). 21(51.2%) case were below 2 years of age,11(27.5%) between 2to 5 years and 8 (20%) were above 5 years of age[14] Kumar M et al, studied clinical profile of status epilepticus in children in a tertiary care hospital in Bihar, in 2014. Out of 70 patients, 42.85% were <4 years of age group, 18.5% from 4- 6 years age group and 38.57% were from 6-12 years group. In their study, male children were more commonly affected , 60.9% while 39.1% were female children [15]. Predominant involvement of younger age group has been reported previously. The reason for this predominance of SE in younger children is not known. Probably, brain is not fully matured and myelinated so mechanisms for control of seizure activity are fragile in younger children and may get disrupted with minimal abnormalities in neurofunction. In our study we observed that males were more 55(52.4%) as compared to that of female subjects 50(47.6%). Similar study done by Das N K et al, found that the incidence 24 (60%) were male and rest 40 % were female[14]. Selvan T et al, found that Males (51.51%) were affected more than the females (48.48%)[16]. Our study demonstrated that, most common type of seizures noted was generalised tonic clonic seizure. It was seen in (70.5%) subjects followed by focal seizures 30(28.6%), and only 1% was myoclonic seizures .This was consistent with the study done by Das N k and colleagues, most common type of seizure was GTCS30(75%) followed by focal seizure 89(20) and myoclonic seizure were 2(5%)[14]. In our study maximum no. of subjects 62(59%) were presented with duration of convulsion more than 30-60 minutes, followed by 38(36.2%) subjects were presented with convulsion more than 5-30 minutes and 5(4.8%) subjects presented with convulsion more than 60 minutes .These results were in concordance with the study done by Siddiqui T et al, where duration of convulsion

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%)[48][17]. In our study, out of 105 Subjects past history of convulsion was present in 26(15.23%) and absent in 89(84.8%., study done by Das N K et al, found that 27(67.5%) cases had no history of prior seizures[14]. According to the kuppuswami's classification of socioeconomic status[18] in our study maximum subjects 51(48.6%) belong to lower SES class, followed by subjects 37 (35.2%) belong to lower middle class, and 17(16.2%) subjects belong to middle class. We found that maximum subjects were belong to lower SES because of more hospitalization in GOVT hospital. Our study we observed that Infective etiology was more in lower SES because of poor sanitation. It's incidence can be reduced by proper vaccination as Hib, meningococcal, and measles and by improving the nutritional status and by promoting hygienic practice.

Our study demonstrated that 47 (44.80%) subjects had controlled seizure >30-60 min duration,38(36.20%) subjects had controlled seizure >5-30 min, 4 (4.70%) subjects had controlled seizure over 1-24 hours, 9(8.6%) subjects had controlled seizure over 24 hours and only 1% subject had controlled seizure within 0-5 min. We found prolonged duration seizure due to no pre -hospital management in society. so seizure not controlled early difficult to manage.similar study also found Gainza,et al[19].In our study, most common seizure type noted was generalised tonic clonic .It amounted for maximum numbers of deaths, Autonomic instability due to GTCS leads to raised ICP, increase BP and hypoxia which leads to multi organ failure and poor outcome. So mortality rate was more in GTCS. This was consistent with the study done by Das N K, most common type of seizure was GTCS (generalized tonic-clonic seizure) in which 90% mortality was seen in patients presenting with GTCS,[14].In our study, out of 23 who required Mechanical ventilation at the time of admission 17(73.91%) subjects died . out of 82 subjects who did not required MV at presentation 3(3.66%) died. Patients who required Mechanical ventilation at the time of admission had 74.61times higher odds of mortality as compared to those not requiring MV

support on admission. In another study done by Arun PT, et al [20]. Mechanical ventilation was needed among 10 (20%)

Conclusion

All efforts should be made for early diagnosis, aggressive management with proper dose of AED to reduce the duration, severity and complications of status epilepticus. Early interventions to minimize the neuronal damage caused by noxious systemic and electrical features of SE.

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