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Etiology, Clinical Characteristics, Treatments and Short-Term Outcomes of Status Epilepticus among Children Admitted in Intensive Care Unit at Benghazi Pediatric Hospital in 2019

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Summary

Status epilepticus (SE) is a major clinical problem, frequently occurring in childhood, with a high potential for morbidity. Current estimates of the incidence of status epilepticus in children vary by age. The incidence is highest in the neonatal period and declines until approximately five years of age. Estimates in the neonatal to first year of life are approximately 135–150 incidents per 100,000 people, with higher incidence in vulnerable populations with acute or chronic neurologic conditions.

Aim of the study: To assess the clinical characteristics of status epilepticus cases and to identify the etiology, managements and short-Term outcomes among children in the intensive care unit (ICU) at Benghazi pediatric Hospital.

Patients and Methods: A descriptive case series study was conducted from intensive care unit ICU at Benghazi Paediatric Hospital. A Sample was 113 child with SE. The study was conducted during the period between 1st January 2019 to 30th September 2019. Variables studied include the following; age, gender, residency either from Benghazi city or outside Benghazi, date of admission and duration of stay at ICU. Type of convulsion either generalized tonic and clonic seizures or focal and if the seizure is the first attack or known case of epilepsy. The aetiology, the management and finally the outcomes of cases. Statistical analysis on study results was performed by the application of (SPSS).

Results: Common age group with SE were from less than 1 year to 5 years. The minimum age of children were 2 months and the maximum age were 13 years. The majority of cases from Benghazi City. The patients had first attack of seizure in 69%, associated medical co-morbidities not neurological illness were in 18.5% of cases only. The vast majority of children had generalized tonic and clonic convulsion. The most common cause in pediatric patients were central nervous system infections (26.6%) followed by progressive neurodegenerative disease (11.5%). The management of the patients according to guidelines in Benghazi pediatric Hospital, intubation was

done in 30% of cases, the patients received diazepam infusion or midazolam infusion in 19.4% and 22.1% of cases were died while nearly 78% were discharge from the ICU.

Conclusion: The SE were common in age group from less than 1 year - 5 years. The most common cause in pediatric patients were central nervous system infections including meningitis and encephalitis followed by hypoxia, progressive's neurodegenerative disease and inborn errors of metabolism and febrile status epilepticus are also common etiologies in children. The outcomes were the worst among the youngest children.

Recommendations: As status epilepticus is a common neurologic emergency requiring rapid and simultaneous efforts to identify and manage acute precipitants, manage systemic complications, and terminate seizures. Having a pre-determined plan may streamline management and avoid delays.

Key Words*: Seizure-Status Epilepticus-Children-Intensive Care Unit-Benghazi-Libya.*

Introduction

Status epilepticus (SE) is a main medical problem, commonly happening in childhood, with a high probability for morbidity.[1] SE is one of the greatest vital conditions in pediatrics and needs rapid and proper action and treatment.[2] Conventionally, short-term seizures are defined as lasting less than 5 minutes, whereas extended seizures lasts between 5 and 30 minutes;[3] SE is defined as a critical epileptic condition categorized by continuous seizures (non-convulsive or convulsive, generalized or partial) for not less than 30 min, or through 30 min of alternating seizures without complete regaining of consciousness between seizures. Refractory status epilepticus (RSE) is identified if SE persists for more than 60 min.[2] RSE is the perseverance of seizure activity regardless of adequate antiepileptic drug (AED) and medical therapy. The mortality rate of RSE is higher than for SE. In which, 9% of SE adult is refractory with 39% mortality rate. While in children, the outcome and incidence of RSE is less clear. [4]

Among different SE classes, the generalized tonic clonic status is the most common type and brings the highest morbidity and mortality. [5] Currently, convulsive (tonic—clonic) status epilepticus (CSE) is well-defined as a general convulsion lasting 30 min or longer, or recurrent tonic—clonic convulsions repeated over 30 min without regaining of awareness between each convulsion. [6] In developed countries, CSE is the most common and emergent childhood neurological disease and can lead to neuro cognitive sequelae and death. [7]

Patients with SE needs rapid, targeted and aggressive treatment to reduce and to some extend to prevent systemic complications, neuronal damage and the rate of mortality and morbidity.[8,9] Debates concerning when and how to treat SE have been explained in the literature. [8] There is a higher probability of worse outcome and weak response to treatment in case of delayed treatment.

The first line treatment is Lorazepam, succeeding steps are less well-known. Although, there are many other options such as intravenous valproate, fosphenytoin, propofol, phenobarbital and midazolam.[10]

The prevalence of SE is 18 to 23 cases per 100,000 children/a year. [9] The quality of outcomes and emergency care are supposed to be improved by standardized guidelines. [11] The three simultaneous components of management includes: identifying and managing of underlying precipitant etiologies, anticonvulsants administration to end the seizure(s), and identification and management of systemic problems that could lead to secondary brain injury. [9]

The underlying cause of (SE) is frequently simply recognized with a standardized approach. A neurological examination, careful history taking and basic laboratory tests may be identifying the most common etiologies of SE, such as changes in antiseizure treatment and non-adherence or infections of central nervous system (CNS), intoxication, remote or acute structural brain injury, and severe metabolic imbalances, [12] ischemic stroke, early catastrophic brain hypoxia, trauma and non-epileptic seizures[13] Though in about 20% of SE cases, all of these initial work-up might be ambiguous, so the clinicians is left with the problems of finding one of the numerous unusual reasons of SE. [12]

The identification, determination and treatment of the SE underlying cause is the priorities in the control of seizures. [12] Based on etiology, SE can be classified into five groups (febrile, idiopathic, acute symptomatic progressive encephalopathy or remote symptomatic).[4,5] the outcome of SE depended on etiology. The huge majority of children who sustained new motor or cognitive sequelae (9.1%) and all of the children that died (3.6%) are mainly belonged to the progressive encephalopathy and acute symptomatic groups. [4]

The prevalence of SE is comparatively low among the ages of 5 and 40 years. Recently, the population-based study evaluates the prevalence of SE is between 5 and 15 cases per 100,000 people. In spite of the higher prevalence of SE in children than adults, the overall mortality of status epilepticus is lower in children than in adults. Although, the morbidity and mortality rate directly from SE is hard to differentiate from the original cause of the seizure. [14] SE complication can be neurological, medical, delayed and immediate. Neurological complications comprise recurrent and progression to chronic epilepsy. While, the medical complications comprises cardiac damage and cardiac arrhythmia as a results of catecholamine surge, hypoxia, respiratory failure, hypoventilation, pulmonary edema, aspiration pneumonia, fever, and finally, leukocytosis. Leukocytosis is serious and common complication noticed in SE cases. [13] The aim of this research is to study the profile of status epilepticus children at Benghazi pediatric Hospital in 2019.

Patients and Methods

Study design & study settings: A descriptive case series study was conducted from intensive care unit (ICU) at Benghazi Pediatric Hospital.

Study duration: The study was conducted during the period between 1st January 2019 to 30th September 2019.

Study sample: A convenient sample of 113 child diagnosed as status epilepticus admitted to ICU at Benghazi Pediatric Hospital.

Data collection and variables of the study: The total cases admitted to the ICU at Benghazi pediatric Hospital for nine months duration in 2019. Variables studied include the following; age, gender, residency either from Benghazi city or outside-Benghazi, date of admission and duration of stay at ICU. Type of convulsion neither generalized tonic and clonic seizures or focal and if the seizure is the first attack or known case of epilepsy. The etiology, the management and finally the outcomes of cases.

Ethical Considerations: After verbal consent taking from the head of the intensive care unit (ICU) and from head of the statistical department at Benghazi pediatric Hospital (Teaching Hospital). Confidentiality of data was guaranteed.

Statistical methods: Statistical analysis on study results was performed by the application of the statistical package social science software version 17 (SPSS). Data collected and then analyzed and expressed as frequency distributions and then computed in percentages in tables and figures. Simple descriptive statistical parameters such as ratio, mean, standard deviation, minimum and maximum were done. For categorical variables, chi-square test was applied for test of association. P-value of less than 0.05 was considered statistically significant in all statistical analyses.

Results

The demographic characteristics of SE children

Out of all 843-child admitted to ICU at Benghazi Pediatric Hospital in a period from 1st January 2019 to 30th September 2019, a total of 113 cases representing 13.4% were status epilepticus. The patients were nearly equally distributed in gender between male (50.44%) and female (49.56%) (Figure 1), aged from 2 months to 13 years (mean age 1.6903±0.721 years). Few above half of children were in age group from 1-5 years (59, 41.6). While, the least number of children were in age group from 6-10 years (2, 1.8%) (Figure 2). The majority of SE cases were from Benghazi city (94, 83.2%) and the rest (19, 16.8%) were from outside Benghazi as follows; Five children from Bayda, four from Derna, three from Tobruk, two from Alabyeer, one child from Gerdina, one from Tokra, one Saloog, one Jalo and one from Ajdabiya (Figure 3).

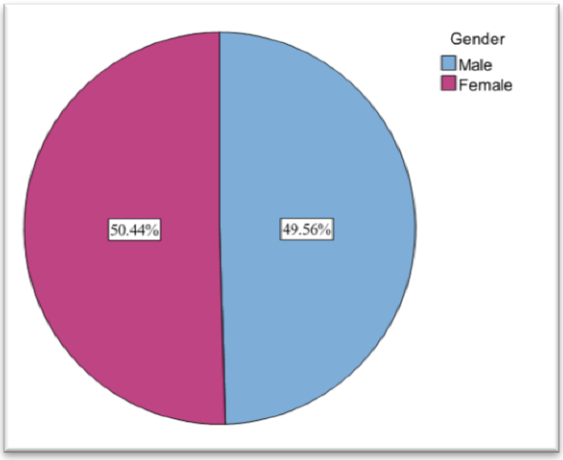

Figure (1) : Distribution of cases of status epilepticus in ICU at Benghazi Pediatric Hospital, during the period from 1st January 2019 to 30th September 2019(N= 113).

Male 56, Female 57, M:F ratio nearly same 1:1

Table (1): Distribution of children with status epilepticus in ICU by age at Benghazi Pediatric Hospital 2019.

Ages of patients	Number of patients	Percentage %
Less than 1 Year	47	41.6
1-5 Years	59	52.2
6–10 Years	2	1.8
More than 10 years	5	4.4
Total	113	100

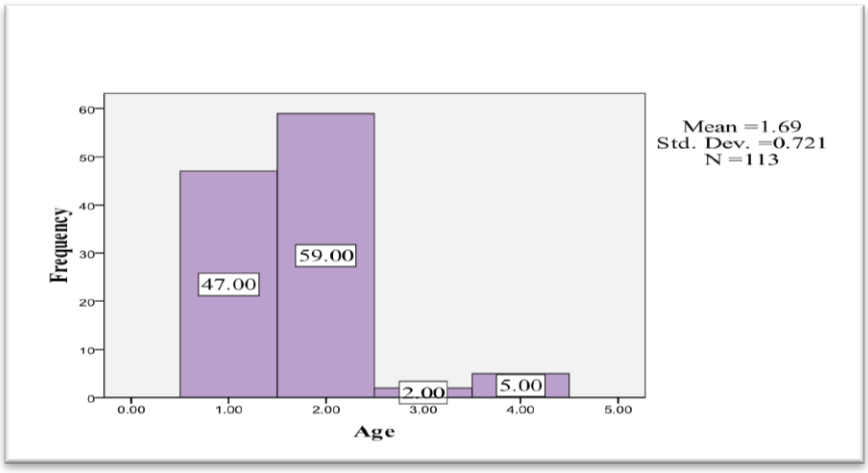

Figure (2): Distribution of children of SE according to age.

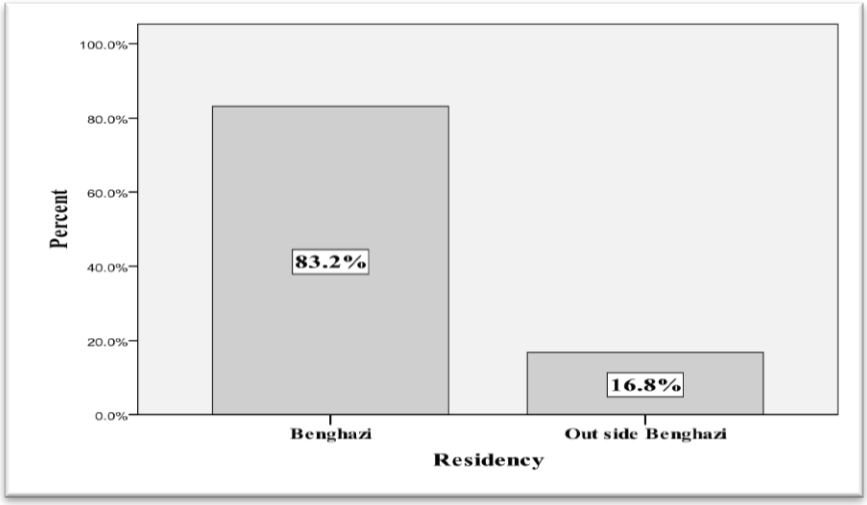

Figure (3): Distribution of patients with SE according to residency.

The clinical characteristics of SE children

The cases stayed at ICU for different periods ranging from (1 day to more than 10 days). Where, forty-six (40.7%) stayed for more than 10 days, thirty (38.1%) of cases stayed from 1-5 days and forty (35.4%) stayed from 6-10 days (Table 3). An about three quarter (69.03%) of cases had no previous history of seizures at the first presentation of status epilepticus and only 30.9% had known neurological abnormalities of epilepsy (Table 3, Figure 4). The cases with co-morbidity of non-neurological illness were only twenty-one (18.5%). The co-morbidity includes multiple congenital abnormality among six cases, Anemia among three cases, Brnchopneumia among four cases, congenital heart disease among three cases, one case intussception, one case inguinal hernia, one case child abuse and two cases wilms tumor (Table 3). The vast majority of children nearly 88 % had generalized tonic –clonic convulsion and the rest 12.4% had focal convulsion (Figure 5).

Table (3): Distribution of children of status epilepticus in intensive care unit (ICU) according to clinical Characteristics at Benghazi Pediatric.

Characteristics	Details	Number	Percentage %
Duration of Stay at ICU	1-5 days	46	40.7
	6-10 days	30	26.6
	>10 days	40	35.4
First attack of seizure	Yes	78	69.03
Known cause of epilepsy	Yes	35	30.9
*** * Co- morbidity Not neurological illness**	*** *** Yes	21	18.5

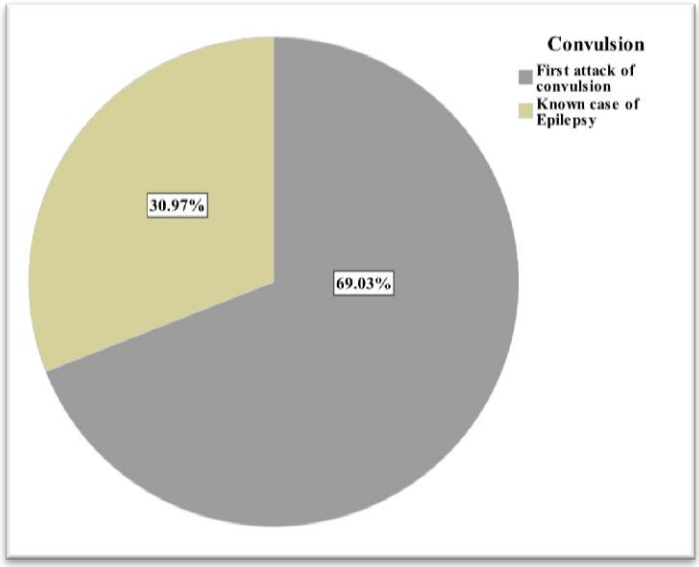

Figure (4): Distribution of cases of status epilepticus to onset of epilepsy.

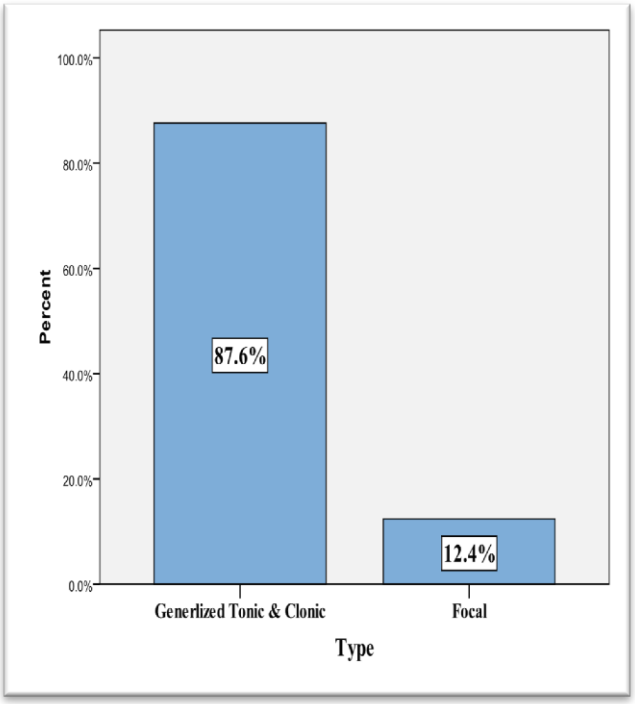

Figure (5): Distribution of cases of status epilepticus type of seizures.