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### A retrospective observational study on the assessment and treatment pattern of different types of epileptic seizures in pediatrics.

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#### ABSTRACT

##### Background

An epileptic seizure is a period of occurrences based on abnormally excessive synchronous neuronal activity in the brain. The effect of this presents as uncontrolled shaky movements that include much of the body, as well as loss of consciousness or altered consciousness as seen in tonic clonic seizures or focal seizures respectively. When a seizure lasts for more than a short time, it is considered a medical emergency. In this study, we aim to assess the different types of seizures with respect to their manifestation and treatment.

##### Methods

The present study was conducted in the department of paediatrics at Amrutha Hospital, Hanamkonda, between January 2019 and June 2019. It is a prospective study in which children of age New born to 12 years with a clinical diagnosis of epileptic seizures were included.

##### Results

From the total admissions of the PICU, the frequency of the children who are affected by the Seizures was found to be 68% for the males and 31.3% for the females which are in the present study. The percentage for males in the types of seizures observed in the study which includes Afebrile, Febrile, GTCS and Focal were (10%, 28.6%, 14.7%, 15.3%) respectively and the corresponding values for the females were (5.3%, 14.7%, 6%, 5.3%). It is observed therefore that the occurrence of Febrile seizures account for the major presence of epileptic seizures in paediatrics followed by Focal, GTCS and Afebrile seizures (in males), Febrile seizures, GTCS, Focal and Afebrile seizures respectively (in females).

##### Conclusion

In the present study, among all types of seizures the prevalence and incidence rate was found to be more with febrile seizures. As seizures possess a relatively varied mortality rate in children the early recognition and patient education is required.

**Keywords:** Seizures, febrile, paediatric, epileptic.

#### INTRODUCTION

A seizure is a brief period of abnormally neuronal activity that involves altered or total loss of consciousness in variable levels, as well as shaky movements and subtle loss of awareness, as seen in absence seizure. Mostly, it lasts for less

than 2 minutes and it takes time to return to normal. It is a brain disorder, in which clusters of nerve cells or neurons in the brain cause abnormal sensations, which results in spasms, convulsions and loss of consciousness. Seizures can be classified, based on clinical observation, into focal

seizures/partial seizures, which is either simple (consciousness is not impaired) or complex seizures (consciousness is impaired), and generalized seizures which can be absence, myoclonic, clonic, tonic-clonic and atonic seizures.<sup>1</sup>

Approximately 8-10% of people will experience an epileptic seizure during their lifetime. In children, the probability of a seizure recurring is medium, but the risk becomes considerably higher after two unprovoked seizures. Generalized seizures have a higher possibility of occurring in children under the age of ten. Idiopathic epilepsy, which refers to a seizure that occurs due to an unknown cause, is prevalent in about 70 percent of new cases.<sup>2</sup>

Status epilepticus refers to a series of seizure activity with no recovery between the successive phases. An Epilepsia partialis continuum is a rare type of seizure (focal) that recurs every few seconds for extended periods. It mostly occurs as a result of strokes in grown-ups, or cortical inflammatory processes in kids, which is due to probable viral infections related conditions.<sup>3</sup>

The basis of this study is profoundly based on the manifestation of epileptic seizures, as they are normally stereotypical, last for a short time, mostly cause physical harm as well as postictal confusion, and rarely cause psychiatric alterations as opposed to non-epileptic seizures. In neonates, brain malformations, lack of oxygen during birth, maternal drug use, intracranial hemorrhage, and inborn errors of metabolism may lead to seizures. In infants and children, the main causes of seizures are fever, infections and rarely brain tumors. Epileptic seizures are diagnosed with EEG monitoring, Serum AED concentrations (metabolic screening of blood, urine or CSF), Neuroimaging (MRI brain), and overall clinical assessment of patient.

The treatment protocol of seizures involve Benzodiazepine as a first line drug therapy, in which case, lorazepam, diazepam, midazolam, carbamazepine and lamotrigine, may be administered. The second line drug therapy would be phenytoin, fosphenytoin, phenobarbital, levetiracetam, or topiramate. Residual therapy involves a continuous infusion of pentobarbital, midazolam and propofol and general anesthesia is used as an alternative therapy.<sup>4-10</sup>

## MATERIALS AND METHODS

This is a retrospective observational study being focused on Children (New born – 12 years) with epileptic seizures. Using WHO criteria, a retrospective study is being carried out to determine the type of epileptic seizures occurring in individuals and the requirement of types of treatment parameters applied in hospitalized patients. The protocol and data collection form of study was submitted to Chaitanya College of Pharmacy Education & Research after the review of study documents by the members of the department the study was approved.<sup>11-13</sup>

## RESULTS AND DISCUSSION

From the total admissions of the PICU, the frequency of the children who are affected by the Seizures was found to be 68% for the males and 31.3% for the females which are in the present study. Comparatively, the frequencies of the children who are affected by the Seizures were more in the observed study although it pays to bear in mind that the sample population in the observed study was more.<sup>14</sup>

The most common type of Seizures in the study was febrile seizures which occupy 43.3% of total cases followed by generalized tonic clonic seizures and Focal seizures which both constitutes for 20.7%.

Afebrile seizures accounts for 15.3% which is considerably lower than the rest. In an observed study the most common type of seizures is febrile seizures followed by Tonic Clonic seizures, and Absence seizures. Febrile seizures are recognized as the most common cause of seizures in children, it was also the most common cause of seizures in this study. Because the reference hospital is a tertiary level hospital, the complicated cases are referred to our PICU and majority of cases are treated outside in the government hospitals.<sup>15</sup>

In this study, based on the type of seizures manifested, the male patients are more affected than the female patients. The percentage of the male patients with seizures is 68.6% and female patients are of 31.4%. In a previously observed study, the male patients constituted 61% and the female 29.7%. The percentage for males in the types of seizures observed in the study which includes Afebrile, Febrile, GTCS and Focal were 10%, 28.6%, 14.7%, 15.3% respectively and the corresponding values for the females were 5.3%, 14.7%, 6%, 5.3%. It is observed therefore that the occurrence of Febrile seizures account for the major presence of epileptic seizures in paediatrics followed by Focal, GTCS and Afebrile seizures (in males), Febrile seizures, GTCS, Focal and Afebrile seizures respectively (in females). These values from the case study corresponded with the reference values.

Fever and its related symptoms were found to be the most common cause of febrile seizures in this study (43.7%). The common cause of Tonic clonic seizures is up rolling of eyes (20.7), twisting of limbs (19.8%), etc. In a study observed, the causes of tonic clonic seizures were characterized by physical movements, which include twitching and convulsive shaking as well as twisting of limbs.<sup>16</sup>

Another major cause of febrile seizures, which occurs as febrile convulsions in this study, is underline bacterial infection and in previous studies, the causes of febrile seizures were infections in the central nervous system characterized by neurological complications and epilepsy.

The need for Cox-2 inhibitors is of 45.3% of total febrile seizures patients. In previous studies the need for related therapy for febrile seizures in patients ranged from 16.07% to 73.68%.

In this study, the treatment of Tonic Clonic seizures includes aggressive anticonvulsants and appropriate antibiotics which follow guidelines.

The application of treatment protocol in this case study was categorized by the classes of Antibiotic {which has a subclass of Cephalosporin (71%), B-lactam (16%), Aminoglycoside(20%) and Glycopeptide (5.3%)}, H-2 antagonist (58.6%), Serotonin antagonist (54.6%), Cox-2 Inhibitor (68%), Anticonvulsant (49.3%), and the respective ratio of application between female and male being (21%:50%), (6%:10%), (8%:12%), (2.2%:3.1%), (19.4%:39.2%), (16.1%:38.5%), (14.6%:30.7%), (19%:30.3%). The application of Cephalosporin antibiotic (71%) was found to be the most frequent, followed by Cox-2 inhibitors (68%), H-2 antagonist (58.6%), Serotonin antagonist (54.6%) and Anticonvulsant therapy (49.3%), which is analogous to existing therapeutic parameters.

The phenomenon of SUDEP (Sudden, unexpected, witnessed or none witnessed, non-traumatic and non-drowning death in patients with epilepsy.) is reported to account for 3-31% of all deaths in people with epilepsy. The incidence in children however is not exactly known but it is thought to be considerably less. If there is an increased mortality risk or rate it would be because of a complication of epilepsy or its treatment (eg. drowning, suffocation or aspiration of gastric contents), or as a consequence of convulsive status epilepticus, or as a result of an underlying static or progressive neurological or anatomical cause (eg. cerebral dysgenesis or a brain tumour). There are very few mortality studies in epilepsy (including SUDEP) regarding paediatrics. The ones that are present show low to moderate

mortality rate in children and the ones that show high mortality rate explain that the majority of the death was caused by the underlying cause rather than the epileptic seizure itself or as a direct complication of the seizure. In the present study, the mortality rate (including SUDEP) was found to be non-existent in a sample size of 150 patients.

The manifestation of epileptic seizure presents as two basic phenomena which includes hyper excitability of a neuron and hyper synchronization (which means that a neuron which possesses hyper excitability affects a large group of its surrounding neurons). This leads to an excessive neuronal activity in the brain, which serves as the primary cause of a seizure. It is based on the irregularity in the transmission of the excitatory impulse (Glutamate being the principal excitatory neurotransmitter) and the inhibitory impulse (GABA being the principal inhibitory neurotransmitter) in the brain. Seizures are caused by the paroxysmal discharges from these neurons or group of neurons that occurs due to excessive excitation or loss of inhibition. Structural lesions which are usually detected in focal seizures involve the cerebral cortex and are characterized by neuronal loss and gliosis. The most common seizures in children are partial complex seizures which originate from the temporal lobe. They usually start with a visceral sensation and are accompanied by impaired consciousness, uncontrolled motor activity and spasms or convulsions. (Table 1 to 4)<sup>18-20</sup>

**Table 1: Patient demographics (N=150)**

<b>Gender</b>	<b>No of cases/ (%)</b>
Male	103 (68%)
Female	47 (31.3%)
<b>Age</b>	<b>No of cases (%)</b>
Neonates (up to 4 weeks)	30 (20%)
Infants (4 week-1 year)	40 (26.6%)
Children (1-12 years)	80 (53.3%)

**Table 2: Incidence of seizure types (N=150)**

<b>Type</b>	<b>No of cases/ (%)</b>
Afebrile	23 (15.3%)
Febrile	65 (43.3%)
GTCS	31 (20.7%)
Focal	31 (20.7%)

**Table 3: Symptoms in study population (N=150)**

<b>Symptoms</b>	<b>No of cases (%)</b>
Fever	(43.7%)
Cold	(10.6%)
Headache	(10%)
Convulsions	(33.7%)
Twisting of limbs	(19.8%)
Vomittings	(11.2%)
Uprolling of eyes	(20.7%)
Seizures	(42.9%)

**Table 4: Drug classes in study population (N=150)**

Class	Drug	No of cases (%)
<b>Antibiotics</b>		
Cephalosporin	Ceftriaxone	71%
Beta- lactam	Piperacillin	16%
Aminoglycoside	Tobramycin	20%
Glycopeptide	Vancomycin	5.3%
H2 antagonist	Ranitidine	58.6%
Serotonin antagonist	Zofer	54.6%
Cox-2 inhibitor	Paracetamol	45.3%
Anticonvulsant	Phenytoin	49.3%

## CONCLUSION

Seizure is one of the most common emergencies in paediatrics. Majority of cases are in the age group of 1 month to 12 years. Male patients are more affected than female patients. Among 150 paediatric patients the most common type of seizure is febrile seizure, followed by Generalized Tonic clonic seizures, Focal and Afebrile seizures. The common cause for Febrile seizure is underlying fever and related symptoms and cause for Generalized and focal seizure was infection and neurological/genetics related complications. The common cause for Afebrile seizure is Birth asphyxia (12.3%), Neurocysticercosis (8.8%), Structural brain abnormalities (7.1%).

The diagnostic tools in the seizure patients includes Electroencephalogram (EEG), Computerized Tomography scans (CT), Magnetic Resonance Imaging (MRI). The diagnostic barriers include, Dependence on non witnessed events, insufficient history/description of events, Possibility that psychogenic or physiologic events are mimicking seizures, Reliance on prior diagnosis and over interpretation of the EEG.

The mortality rate was found to be non-existent in this study based on a sample size of 150 patients. When it does occur in children however, it is usually due to late recognition of underlying infection or other neurological complications or sometimes as a direct result of the epileptic seizures, as seen in tonic clonic and it is referred to as SUDEP (Sudden unexpected death in epilepsy) which account for a majority of death in epileptic seizures as new studies have shown. The

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mortality rate will be less if early recognition and aggressive management takes place. The need for additional therapy is usually more in non-survivors (prior to their death) when compared with survivors.

Cox-2 inhibitors were used in most of the patients with febrile seizure than in other type of seizure. Combination of medication was used such as Tobramycin and Vancomycin or Acetaminophen and Ondansetron and drug alternatives were used in some patients. Generalized, Focal and Afebrile seizure was treated with appropriate antibiotics and fluid resuscitation.

The incidence and mortality of seizure is increasing timely due to the less awareness about disease and late diagnosis of disease. Therefore, proper patient education regarding disease and identifying of disease condition in early stages is required.

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## CONFLICTS OF INTEREST

The Author(S) of this study hereby declares that there exist no conflicts of interest to DIVULGE.

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