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A STUDY ON PRESCRIBING PATTERNS OF ANTIEPILEPTIC DRUGS IN PATIENTS AMONG THE AGE GROUP OF 3 MONTHS TO 10 YEARS IN PEDIATRICS ICU/WARD IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Title: A Study on Prescribing Patterns of Antiepileptic Drugs in Patients among the Age Group of 3 Months to 10 Years in Pediatrics ICU/Ward in a Tertiary Care Hospital. **Background:** Epilepsy is one of the most common neurological disorders in the pediatric population, and its management is crucial, especially in critical care settings. Appropriate selection and rational use of antiepileptic drugs (AEDs) are essential to achieve optimal therapeutic outcomes and minimize adverse effects. This study aims to evaluate the prescribing patterns of AEDs in children aged 3 months to 10 years admitted to the pediatric ICU/ward of a tertiary care hospital.

Objectives

- To assess the commonly prescribed AEDs in pediatric patients.
- To evaluate the drug combinations, dosages, and routes of administration.
- To analyze the adherence of prescriptions to standard treatment guidelines.

- To identify any drug-related problems or adverse drug reactions (ADRs).

Methodology: A prospective observational study was conducted over a defined period in the pediatric ICU/ward of a tertiary care teaching hospital. Pediatric patients aged between 3 months and 10 years receiving AEDs were included. Data on demographics, diagnosis, AEDs prescribed, dosage forms, frequency, duration, and route of administration were collected and analyzed. The rationality of prescriptions was evaluated using standard guidelines such as WHO and national protocols. **Results:** Preliminary findings indicate that sodium valproate and levetiracetam were among the most frequently prescribed AEDs. Monotherapy was preferred in mild to moderate seizure cases, while polytherapy was more common in refractory seizures and status epilepticus. Most prescriptions adhered to standard guidelines; however, instances of dose adjustment and off-label use were noted, particularly in younger children. **Conclusion:** The study highlights the current trends in AED prescribing in a tertiary care pediatric setting. While overall adherence to guidelines was satisfactory, certain areas, such as polytherapy and dosing in infants, require more standardized approaches. Continuous monitoring and periodic audits of prescribing practices are recommended to enhance the quality of pediatric epilepsy management.

KEYWORDS: Antiepileptic Drugs (AEDs), Prescribing Patterns, Pediatric Epilepsy, Tertiary Care Hospital, Pediatric ICU, Drug Utilization.

INTRODUCTION

Pediatrics is defined as a branch of medicine dealing with the development, care, and diseases of infants, children, and adolescents. The most common diseases which affects children include Pneumonia, Anaemia, Asthma, Jaundice, Epilepsies.[1]

A seizure is a transient occurrence of signs and/or symptoms resulting from abnormal excessive or synchronous neuronal activity in the brain. Seizures that appear to begin everywhere in the brain at once are classified as generalized seizures, while those beginning in one location of the brain are classified as partial seizures.[1]

Epilepsy is a disorder of brain characterized by enduring predisposition to generate seizures and by the neurobiologic, cognitive, psychological and social consequences of this condition. An epileptic syndrome is a disorder that manifests one or more specific seizure types and has a specific age of onset and a specific prognosis.[2]

Classification of Seizures

According to International League against Epilepsy (IlAE) seizures can be classified as follows.[3]

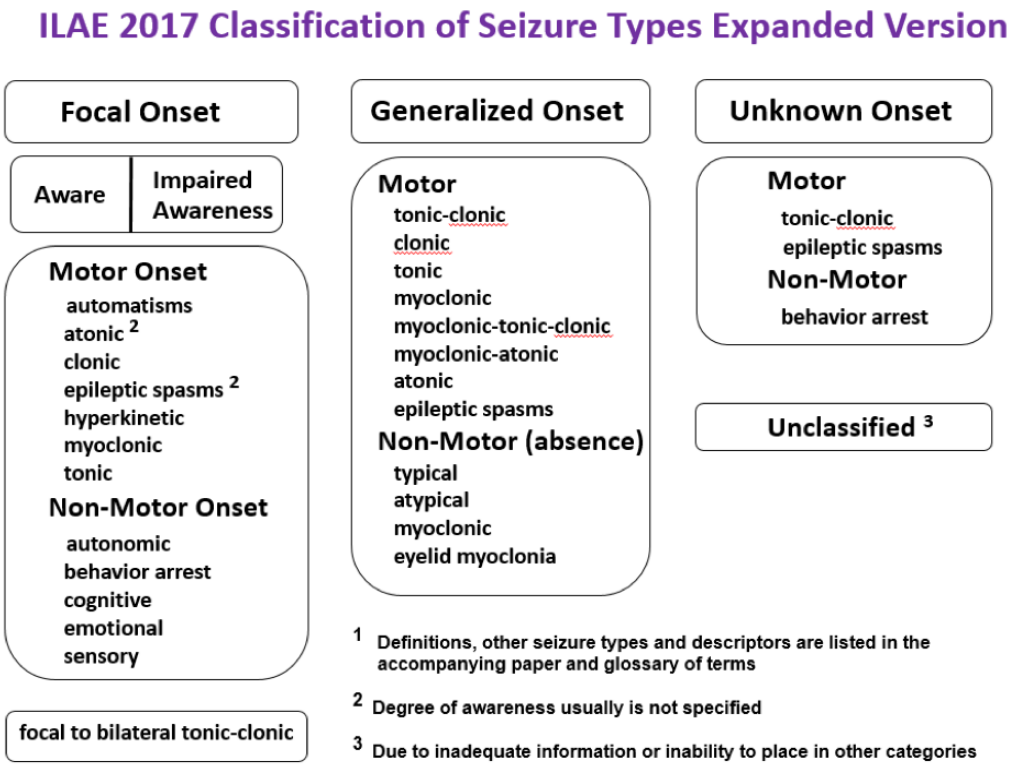

Fig. 1: Classification of Seizures.

Types of Seizures in Pediatric Patients

The type of seizure depends on which part and how much of the brain is affected and what happens during the seizure. The two broad categories of epileptic seizures are generalized seizures (absence, atonic, tonic-clonic, myoclonic) and partial (simple and complex) seizures. Within these categories, there are several different types of seizures in children.[4]

- **Focal Seizures**

Focal seizures take place when abnormal electrical brain function occurs in one or more areas of one part of the brain. Focal seizures may also be called partial seizures. With focal seizures, particularly with complex focal seizures, the child may experience an aura before the seizure occurs. The most common aura involves feelings such as deja vu, impending doom, fear, or euphoria. Visual changes, hearing abnormalities, or changes in the sense of smell can also be auras [4]. Two types of partial seizures include:

- **Simple focal seizures:** The child may show different symptoms depending upon which area of the brain is involved. If the abnormal electrical brain function is in the occipital lobe (the back part of the brain that is involved with vision), the child's sight may be altered. However, more commonly, a child's muscles are affected. The seizure activity is limited to an isolated muscle group, such as fingers or to larger muscles in the arms and legs. Consciousness is not lost in this type of seizure where the seizure is localized to only one side of the brain. The child may also experience sweating, nausea, or become pale.[4]
- **Complex focal seizures:** This type of seizure commonly occurs in the temporal lobe of the brain, the area of the brain that controls emotion and memory function. This seizure usually lasts one to two minutes. Consciousness is usually lost during these seizures. Losing consciousness may not mean that a child passes out--sometimes, a child stops being aware of what's going on around him or her. The child may look awake but have a variety of behaviors. These behaviors may range from gagging, lip smacking, running, screaming, crying, and/or laughing. Consciousness may also be impaired if the seizure spreads from one side of the brain to involve both sides. When the child regains consciousness, he or she may complain of being tired or sleepy after the seizure. This is called the postictal period.[4]

➢ **Generalized Seizures**

Generalized seizures involve both sides of the brain at the same time. There is loss of consciousness and a postictal state after the seizure occurs, although some generalized seizures have very brief postictal states [4]. Types of generalized seizures include the following:

- **Absence seizures (also called petit mal seizures):** These seizures are characterized by a brief altered state of consciousness and staring episodes. Typically the child's posture is maintained during the seizure. The mouth or face may move or the eyes may blink. The seizure usually lasts no longer than 30 seconds. When the seizure is over, the child may not recall what just occurred and may go on with his or her activities, acting as though nothing happened. These seizures may occur several times a day few or dozens of times a day. This type of seizure is sometimes mistaken for a learning problem or behavioral problem. Absence seizures almost always start between ages 4 to 12 years.[4]
- **Atonic (also called drop attacks):** With atonic seizures, there is a sudden loss of muscle tone and the child may fall from a standing position or suddenly drop his or her head. During the seizure, the child is limp and unresponsive.[4]

- **Generalized tonic-clonic seizures (also called grand mal seizures):** The classic form of this kind of seizure, which may not occur in every case, is characterized by five distinct phases. The body, arms, and legs will flex (contract), extend (straighten out), tremor (shake), a clonic period (contraction and relaxation of the muscles), followed by the postictal period. Not all of these phases may be seen with every one of this type of seizure. During the postictal period, the child may be sleepy, have problems with vision or speech, and may have a bad headache, fatigue, or body aches.[4]
- **Myoclonic seizures:** This type of seizure refers to quick movements or sudden jerking of a group of muscles. These seizures tend to occur in clusters, meaning that they may occur several times a day, or for several days in a row.[4]
- **Infantile spasms:** This rare type of seizure disorder occurs in infants usually before six months of age. There is a high occurrence rate of this seizure when the child is awakening, or when they are trying to go to sleep. The infant usually has brief periods of movement of the neck, trunk, or legs that lasts for a few seconds. Infants may have hundreds of these seizures a day. Most infantile spasms have serious underlying causes. Even with proper therapy, they can have long-term complications.[4]
- **Febrile seizures:** This type of seizure is associated with fever and is not epilepsy, although a fever may trigger a seizure in a child who has epilepsy. These seizures are more commonly seen in children between 6 months and 5 years of age and there may be a family history of this type of seizure. Febrile seizures that last less than 15 minutes are called simple, and typically do not have long-term neurological effects. Seizures lasting more than 15 minutes are called complex and there may be long-term neurological changes in the child. Many children who have febrile seizures have genetic conditions.[4]

Etiology of Seizures

Although seizures have many known causes, for most children, the cause remains unknown. In many of these cases, there is some family history of seizures. The remaining causes include infections such as meningitis, developmental problems such as cerebral palsy, head trauma, and many other less common causes. About one fourth of the children who are thought to have seizures are actually found to have some other disorder after a complete evaluation. These other disorders include fainting, breath-holding spells, night terrors, migraines, and psychiatric disturbances.[5]

The most common type of seizure in children is the febrile seizure, which occurs when an infection associated with a high fever develops.[5] Extensive and careful studies have not found any evidence that immunizations cause epilepsy. However, a seizure may occur within 1 or 2 days of an immunization, especially if it is followed by a fever. In such cases, the child probably had an innocent febrile seizure.[5] When the child receives immunizations, the parents should give acetaminophen (Tylenol) or ibuprofen (Advil, Motrin) before a fever develops.[5] Many childhood seizures are *benign*, meaning that they are brief events that will not continue into adulthood, and the child's development and intellect are usually normal. Other seizures are serious and often are associated with developmental delay or intellectual disability and persistent seizures.[5]

- **Factors Causing Seizures**

The factors that lead to a seizure are often complex and it may not be possible to determine what causes a particular seizure, what causes it to happen at a particular time, or how often seizure.[6] All people are capable of having a seizure. It remains uncertain why some children have seizures after incidents such as head injury while most others do not. "Seizure threshold" refers to the conditions necessary for the production of a seizure. In human beings, the term "seizure threshold" is used in a more abstract sense. In persons who have a tendency to have seizures, the threshold is lower than in people who have a greater resistance, or higher threshold, against seizures. Genetic, hormonal, sleep deprivation, and other factors can influence an individual's seizure threshold.[6]

While the exact cause of some seizures can be hard to pinpoint, many seizures can be classified as either *provoked* or *unprovoked*. A provoked seizure would include traumatic injuries to the head, whereas an unprovoked seizure would include seizures caused by, for example, a congenital defect.[6]

- **Unprovoked (“Natural”) Seizures**

Some seizures may be caused by “natural” phenomena occurring in the body, such as a congenital defect or a chemical imbalance. One example of this is a condition called GLUT-1 deficiency.[6] Other examples include:

- Genetic factors
- Congenital (present at birth) problems or conditions
- Metabolic or chemical imbalances in the body

- Fever/infection
- Neurological problems
- Alzheimer's disease
- Unknown reasons.[6]

➢ **Provoked Seizures**

Some seizures are considered provoked if they are caused by an event that happened to the individual. Brain injuries are often the cause of provoked seizures.[6] Other examples include:

- Birth trauma
- Alcohol or drugs
- Head or brain trauma
- Progressive brain disease
- Stroke
- Unknown reasons
- Brain tumors
- Hemimegalencephaly
- Cortical dysplasia
- Mesial temporal sclerosis
- Drug withdrawal
- Medications.[6]

Epidemiology

Seizures are the most common and frightening pediatric neurological disorder, with 4-10% of children experiencing at least one seizure within first 16 years of life. Children below 3 years of age have the highest incidence of seizures than older children.[7] Seizures during the neonatal period are relatively common, occurring in approximately 1.8 to 3.5 per 1000 live births with greater frequency in premature or low birth weight babies as compared to term babies.[8] In the neonatal intensive care unit, the incidence goes as high as 10 to 25%, out of which about 15% will die and 35 to 40% will have major neurological sequel.[9] The prevalence of seizures is >3 per 1000 in developed world as compared to 9 per 1000 in developing nations.[10] Christopher et al described that around 3% of all children below 15 years of age have a seizure, 50% of which are febrile seizures and epilepsy is the underlying cause in one of every hundred children with seizures.[11] Hamdy et al described the annual incidence of seizures was 153 per 100,000 for new onset seizures and it was significantly

higher in south Asians.[12] Sillanpaa et al studied to show that children with epilepsy have 7% life time risk of sudden death at 40 years and 12% in another group of patients with epilepsy.[12] It affects 2% to 4% of all children in Europe and the United States by their fifth birthday.[13] The incidence in other areas varies from 0.35% in Hong Kong,[14] 1% in China to more than 8% in Japan and 14% in Guam.[14] It affects 2% to 4% of all children in Europe and the United States by their fifth birthday.[14] The incidence in other areas varies from 0.35% in Hong Kong,[15] 1% in China to more than 8% in Japan and 14% in Guam.[13]

Classification Of Anti Epileptic Drugs[16]

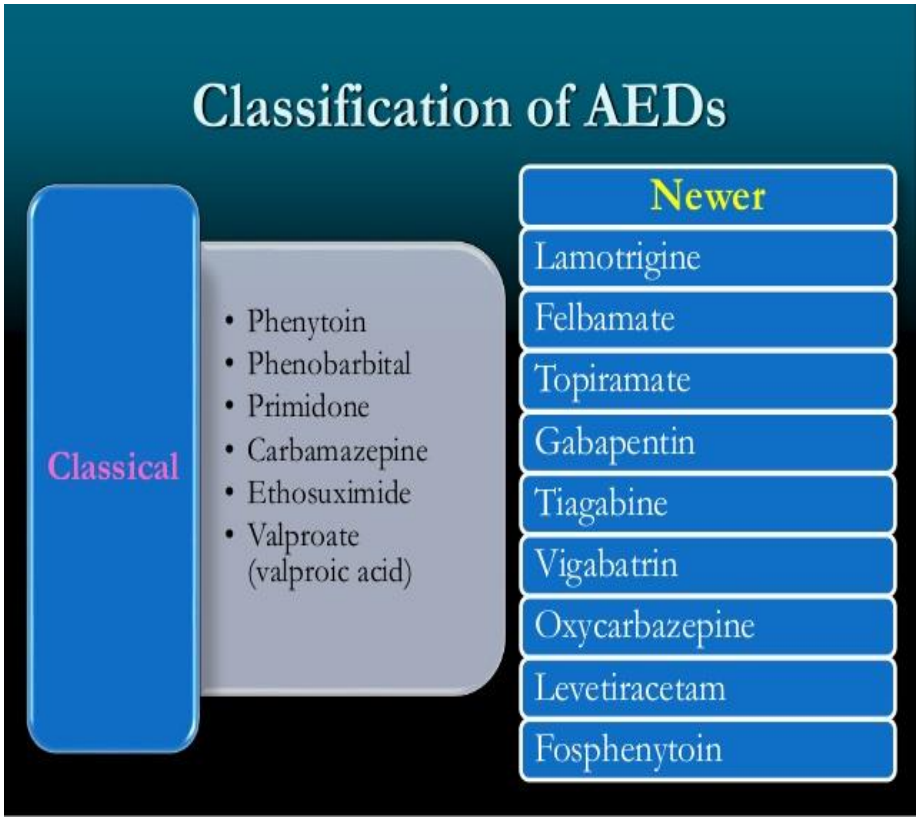

Fig. 2: Classification of AED's.

Table 1: Mechanism of Action, Pharmacokinetics And Uses of AED's.

SUB CLASS	MECHANISM OF ACTION	PHARMACOKINETICS	CLINICAL APPLICATIONS
Cyclic Urides • Phenytoin • Fosphenytoin • Primidone • Phenobarbitol • Ethosuximide	• Blocks high frequency firing of neurons through action of voltage gated Na^+channels. • Decreases synaptic release of glutamate. • Similar to phenytoin	• Absorption is formulation dependent. • Highly bound to plasma proteins. • No active metabolites. • Well absorbed orally. • Not highly bound to plasma proteins.	• Generalized tonic-clonic seizures. • Partial seizures. • Generalized tonic clonic seizures. • Partial seizures. • Generalized tonic clonic seizures.

	but converted to phenobarbitol • Enhances phasic $GABA_A$ receptor responses. • Reduces excitatory synaptic responses. Reduces low threshold calcium currents.	• Nearly complete absorption. • Not significantly bound to plasma proteins. • No active metabolites. • Well absorbed orally. • Not protein bound. • Completely metabolized to inactive compounds.	• Partial seizures. • Myo clonic seizures • Generalized seizures • Neonatal seizures • Status epilepticus • Absence seizures.
Tri Cyclics • Carbamazepine	• Blocks high frequency firing of neurons through action on voltage gated sodium channels. • Decreases synaptic release of glutamate.	• Well absorbed orally. • No significant protiein binding.	• Generalized tonic clonic seizures • Parital seizures.
Benzodiazepines • Diazepam • Clonazepam	• Potentiates $GABA_A$ responses. • Potentiates $GABA_A$ responses.	• Well absorbed orally. • Highly protein bound. • Extensively metabolized to several active metabolites. • Extensively metabolized but no active metabolites.	• Status epilepticus. • Seizure clusters • Absence seizures • Myo-clonic seizures • Infantile spasms
Gaba Derivatives • Gabapentine • Pregabalin • vigabatrin	• Decreases excitatory transmission by acting on voltage gated calcium channels presynaptically. • Decreases excitatory transmission by acting on voltage gated calcium channels presynaptically. • Irreversibly inhibits GABA transaminases.	• Not bound to plasma protiens. • Not metabolized. • Well absorbed orally. • Not bound to plasma protiens. • Not metabolized. • Not bound to plasma proteins. • Not metabolized	• Generalized tonic clnic seizures. • Partial seizures. • Generalized seizures • Partial seizures. • Partial seizures • Infantile spasms
Miscellaneous (Newer Aeds's) • Valproate • Lamotrigine • Levetiracetam • Tigabine • Topiramate • Zonisamide • lacosamide	• Blocks high frequency firing of neurons. • Modifies aminoacid metabolism. • Prolongs inactivation of voltage gated sodium channels. • Acts presynaptically on voltage gated calcium channels.	• Well absorbed from several formulations. • Highly bound to plasma proteins. • Extensively metabolized. • Well absorbed orally. • No significant protein binding. • Extensively metabolized but no active metabolites. • Well absorbed orally. • Not bound to plasma	• Generalized tonic clonic seizures. • Partial seiuzures. • Generalized seizures. • Absence seizures. • Myo-clonic seizures. • Generalized tonic clonic seizures. • Partial seiuzures. • Generalized

	• Decreasing glutamate release. • Active on synaptic protein SV_2A. • Blocks GABA reuptake in forebrain by selective blockade of GAT-1 •Multiple actions on synaptic function, probably via actions on phosphorylation. • Blocks high frequency via action on voltage gated sodium channels. • Enhances slow inactivation of sodium channels. • Blocks effect of neurotrophins.	proteins. • Metabolized to 3 inactive metabolites. • Well absorbed orally. highly bound to plasma proteins. • Extensively metabolized but no active metabolites. • Well absorbed orally. • Not bound to plasma proteins. • Extensively metabolized. • Minimally bound to plasma proteins. • Minimally bound to plasma proteins. • Well absorbed. • One major non active metabolites.	seizures • Absence seizures. • Generalized tonic clonic seizures. • Partial seiuzures. • Generalized seizures • Partial seizures. • Generalized tonic clonic seizures. • Partial seiuzures. • Generalized seizures • Absence seizures • Migraine. • Generalized tonic clonic seizures. • Partial seizures. • Myo-clonic seizures. • Generalized tonic clonic seizures. • Partial seiuzures.

Pharmacotherapy

The goal of treatment is to achieve a seizure-free status without adverse effects.[17] Monotherapy is important, because it decreases the likelihood of adverse effects and avoids drug interactions. Standard of care for a single, unprovoked seizure is avoidance of typical precipitants (eg, alcohol, sleep deprivation).[17] No anticonvulsants are recommended unless the patient has risk factors for recurrence.[17]

Special situations that require treatment include the following:

- Recurrent unprovoked seizures: The mainstay of therapy is an anticonvulsant; if a patient has had more than 1 seizure, administration of an anticonvulsant is recommended.[17]
- Having an abnormal sleep-deprived EEG that includes epileptiform abnormalities and focal slowing, diffuse background slowing, and intermittent diffuse intermixed slowing.[17]

  Selection of an anticonvulsant medication depends on an accurate diagnosis of the epileptic syndrome.[17] Although some anticonvulsants (eg, lamotrigine, topiramate, valproic acid, zonisamide) have multiple mechanisms of action, and some (eg, phenytoin,

carbamazepine, ethosuximide) have only one known mechanism of action, anticonvulsant agents can be divided into large groups based on their mechanisms, as follows.[17]

- Blockers of repetitive activation of the sodium channel: Phenytoin, carbamazepine, oxcarbazepine, lamotrigine, topiramate.
- Enhancer of slow inactivation of the sodium channel: Lacosamide, rufinamide.
- Gamma amino butyric acid (GABA)–A receptor enhancers: Phenobarbital, benzodiazepines, clobazam.
- NMDA receptor blockers: Felbamate.
- AMPA receptor blockers: Perampanel, topiramate.
- T-calcium channel blockers: Ethosuximide, valproate.
- N- and L-calcium channel blockers: Lamotrigine, topiramate, zonisamide, valproate.
- H-current modulators: Gabapentin, lamotrigine.
- Blockers of unique binding sites: Gabapentin, levetiracetam.
- Carbonic anhydrase inhibitors: Topiramate, zonisamide.
- Neuronal potassium channel (KCNQ [Kv7]) opener: Ezogabine.[17]

Non-pharmacologic Therapy

The following are 2 nonpharmacologic methods in managing patients with seizures[17]:

- A ketogenic diet
- Vagal nerve stimulation

Surgical Options

The 2 major kinds of brain surgery for epilepsy are palliative and potentially curative. The use of a vagal nerve stimulator (VNS) for palliative therapy in patients with intractable atonic seizures has reduced the need for anterior callosotomy. Lobectomy and lesionectomy are among several possible curative surgeries.[17]

METHODOLOGY

The detailed illustration of this study was done by categorizing the methodology into five parts. The first part deals with study design. The second part includes ethical considerations. Third part consists of sampling technique, sample size determination. Fourth part includes participants. Final part consists of data collection and analysis.

Study Site and Study Design

The present study was carried out in the department of pediatrics, government general hospital, Kakinada for a duration of 6 months. Our present study requires prior hypothesis, data related to prescribing patterns of anti epileptic drugs, follow up was required and samples of age group among 3 months to 10years old are involved in this study. The above said study characteristics are closely related to characteristic features of prospective study. So we have chosen prospective study as our study design.

Ethical Consideration

Ethical committee approval was obtained from the institutional ethics committee.

Sampling Technique, Sample Size Estimation

Sampling Technique

Based on the nature and aim of the study, a **purposive sampling technique** which involved using a predefined group of study subjects was used. This sampling technique would enable to obtain specific and relevant information about group of pediatric population with seizures and antiepileptic drugs. The selection process can be described as purposive, judgmental based on strict selection criteria for the participants.

Sample Size Estimation

The estimated sample size of the present study is 80.

Participants

The study has been conducted at government general hospital, Kakinada. The participants in this study are the patients who are admitted in pediatric ward(in patients) with a particular diagnosis and on AED therapy.

Inclusion Criteria

- Pediatric patients, among the age group of 3 months to 10years and of either sex who presented with seizures of any etiology.
- Pediatric patients with the diagnosis of epilepsy, receiving at least one AED.
- Children with other co morbidities may also be considered.
- Those who are willing to participate in study.

Exclusion Criteria

- Patients who are critically ill.

- Children of age group less than 3 Months and more than 10 Years.
- Not willing to give consent.
- Patients with uncertain diagnosis.

Data Collection and Data Analysis

Data Collection

Children of age group among 3 months to 10years were selected. The aim and objectives of the study were explained clearly. Upon their will, data was collected from them using already prepared data collection form. The collected data was tabulated periodically till the end of the study period. At the end, the data was analyzed statistically to find the age at first seizure occurred, type of seizure diagnosed, type of therapy used and most widely used drug in children of age group between 3 months to 10 years old.

Data Analysis

Data is analyzed quantitatively and qualitatively. The data which comes under quantitative analysis is Age at which first seizure occurred, mode, median, mean and is plotted by using histogram and line graph.

The data comes under quantitative analysis is Type of seizures diagnosed in children, Type of therapy given for the management of seizures, widely used AED which is analyzed by frequency and percentage of responses and is plotted by using bar chart and pie chart.

RESULTS

Table 2: Age Wise Distribution of patients affected with seizures.

S. No	Age group	Frequency	Percentage
1	3months-1year	12	15%
2	1year-4years	25	31.25%
3	4years-7years	14	17.5%
4	7years-10years	29	36.25%

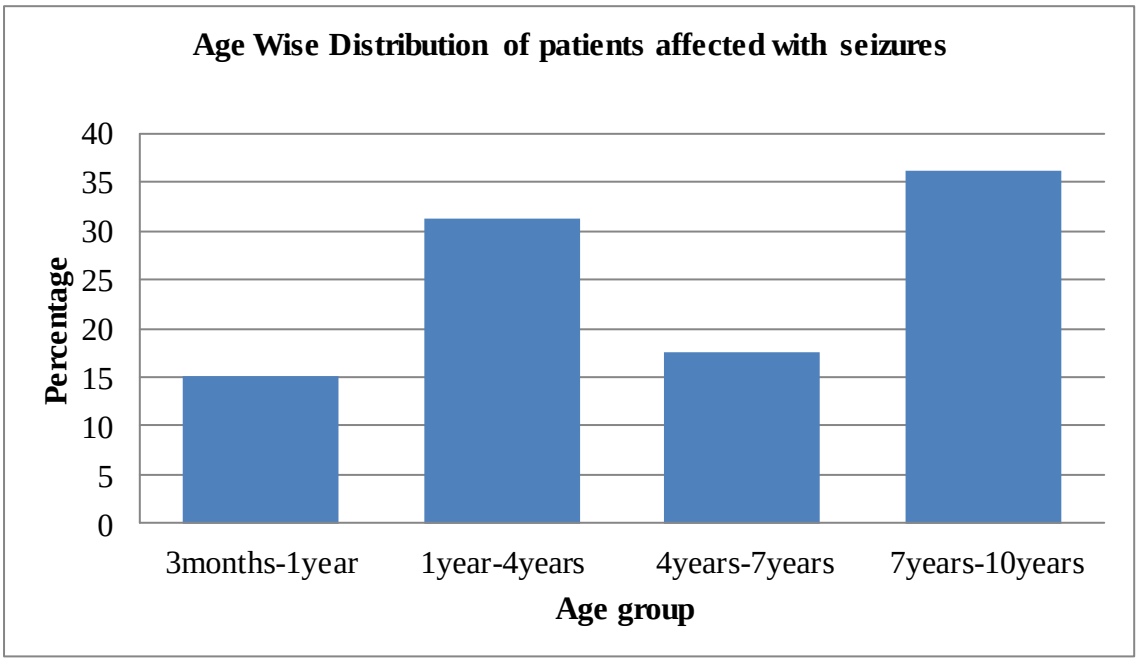

Fig 3: Age Wise Distribution of patients affected with seizures.

Table 3: Gender Wise Distribution of patients affected with seizures.

S.no	Gender	Frequency	Percentage
1	Male	60	75%
2	female	20	25%

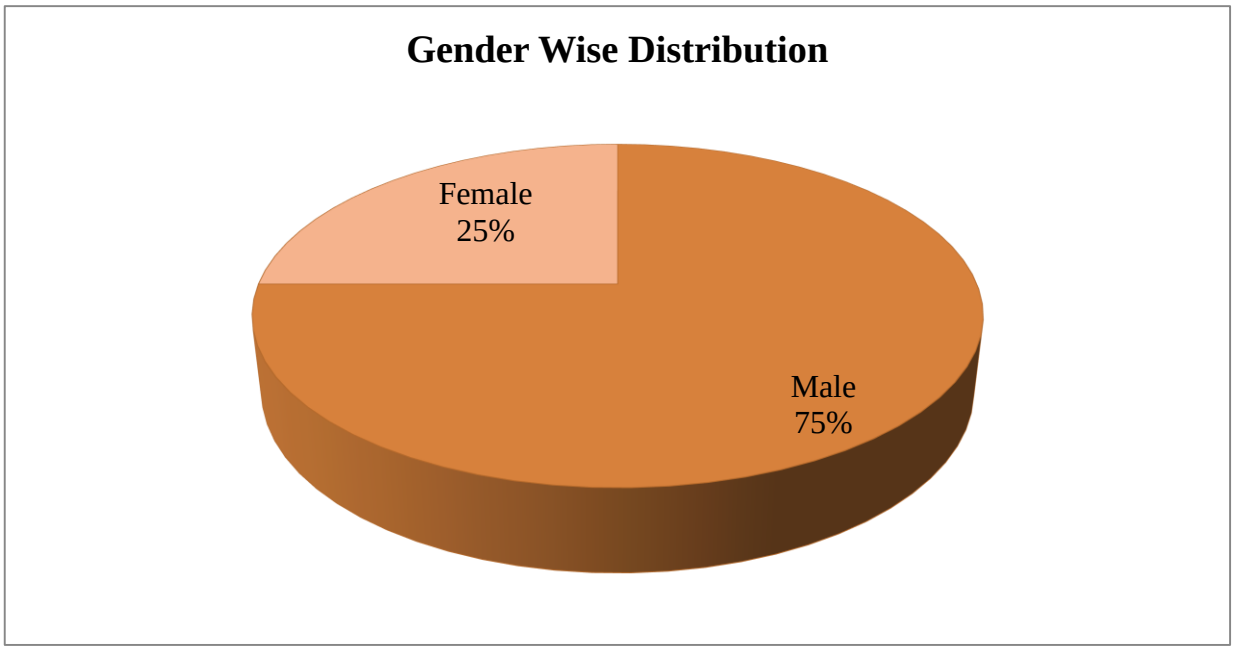

Fig4: Gender Wise Distribution of patients affected with seizures.

Table 4: Area of Residence of seizure affected patients.

S.No	Area of residence	Frequency	Percentage
1	rural	53	66.25%
2	urban	27	33.75%

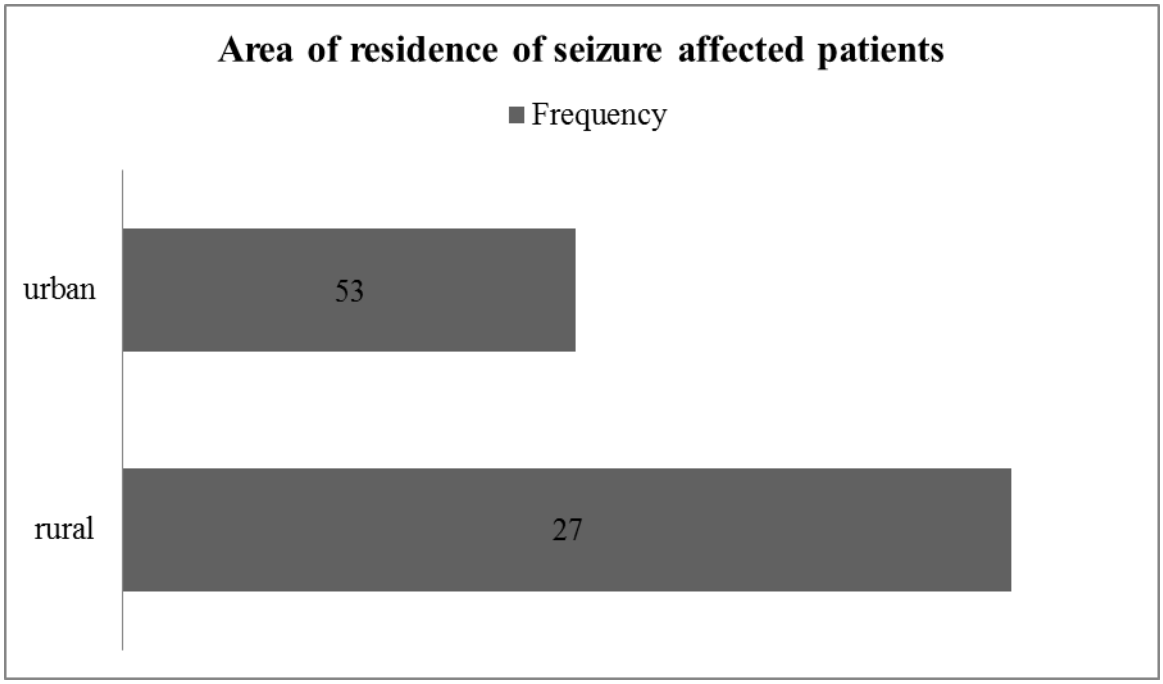

Fig 5: Area of Residence of seizure affected patients.

Table 5: Patients With Family History of Seizures.

S. No	Family history	Frequency	Percentage
1	yes	13	16.25%
2	no	67	83.75%

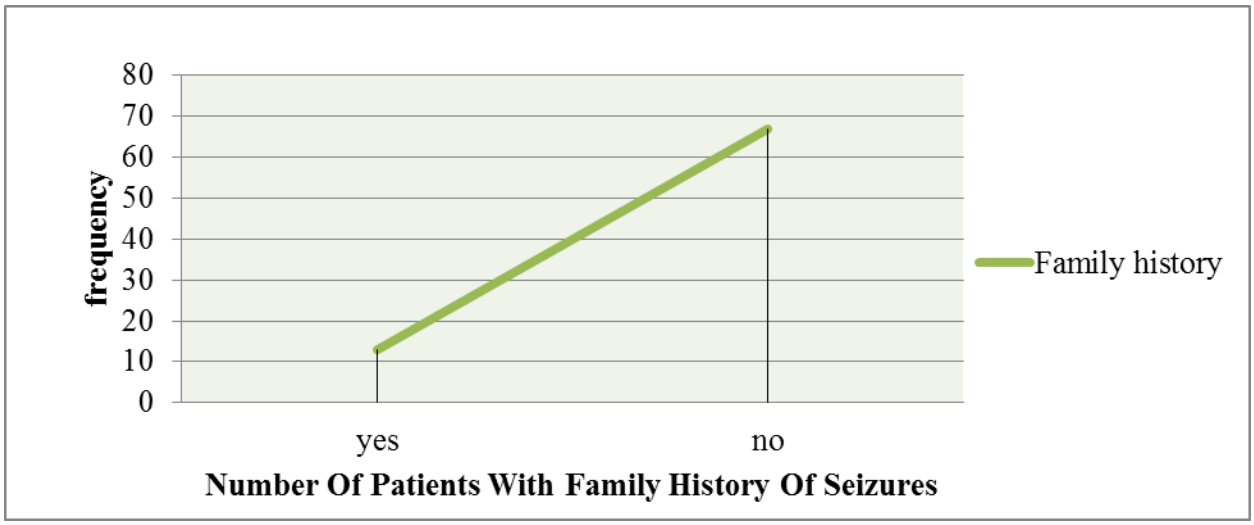

Fig 6: Details of family history.

Table 6: Consanguinity among patient's parents.

S.No	consanguinity	frequency	percentage
1	consanguineous	20	25%
2	Non consanguineous	60	75%

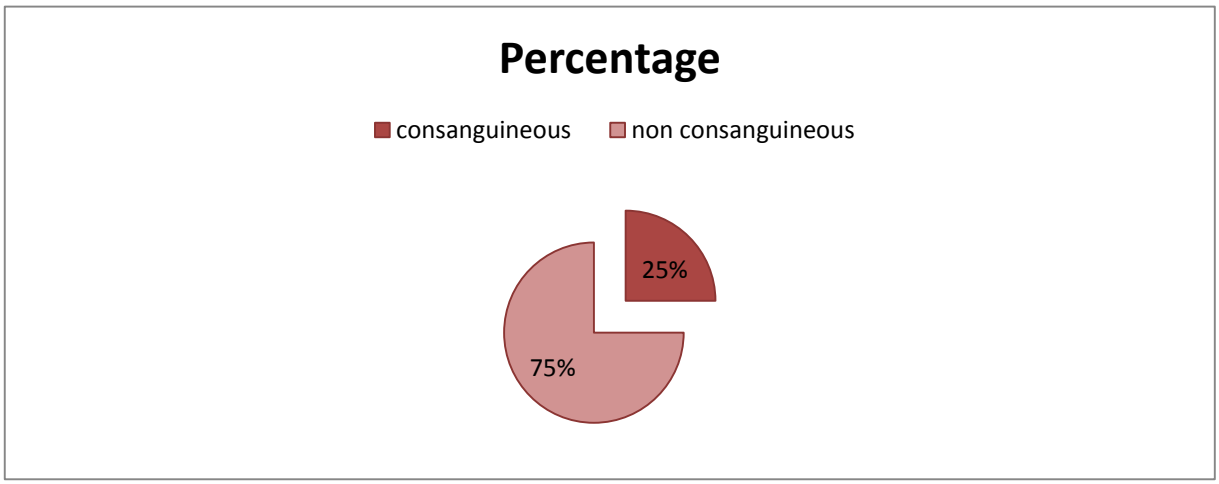

Fig 7: Details of consanguinity.

Table 7: Seizure Episodes.

S. no	Seizure episodes	Frequency	Percentage
1	1	29	36.25%
2	1-2	18	22.5%
3	2-4	5	6.25%
4	>4	28	35%

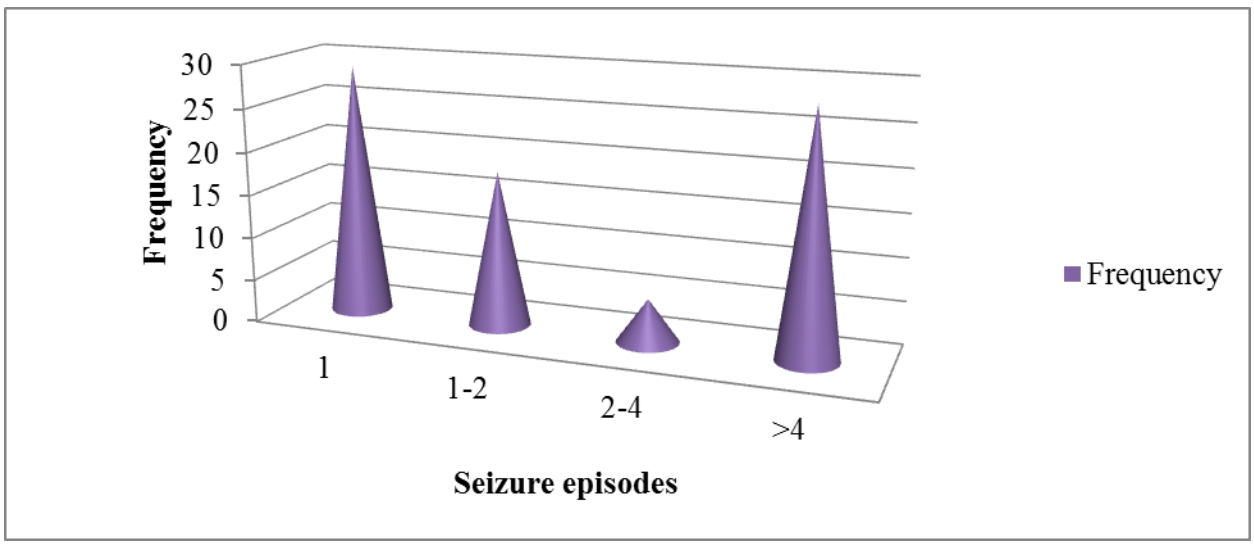

Fig 8: frequency of seizure episodes.

Table 8: Seizure Associated With Fever.

S. no	Seizure associated with fever	Frequency	Percentage
1	yes	31	38.75%
2	No	49	61.25%

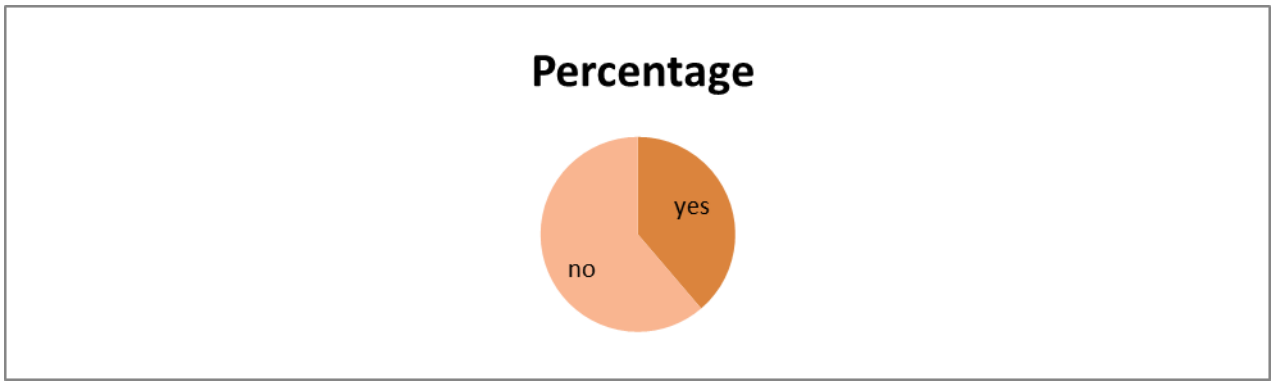

Fig 9: Percentage of patients with fever before seizure episode.

Table 9: Type of Seizure.

s. No	Type of seizure	No of patients	Percentage
1	Generalized seizures	34	42.5%
2	Focal seizures	13	16.25%
3	Unknown	33	41.5%

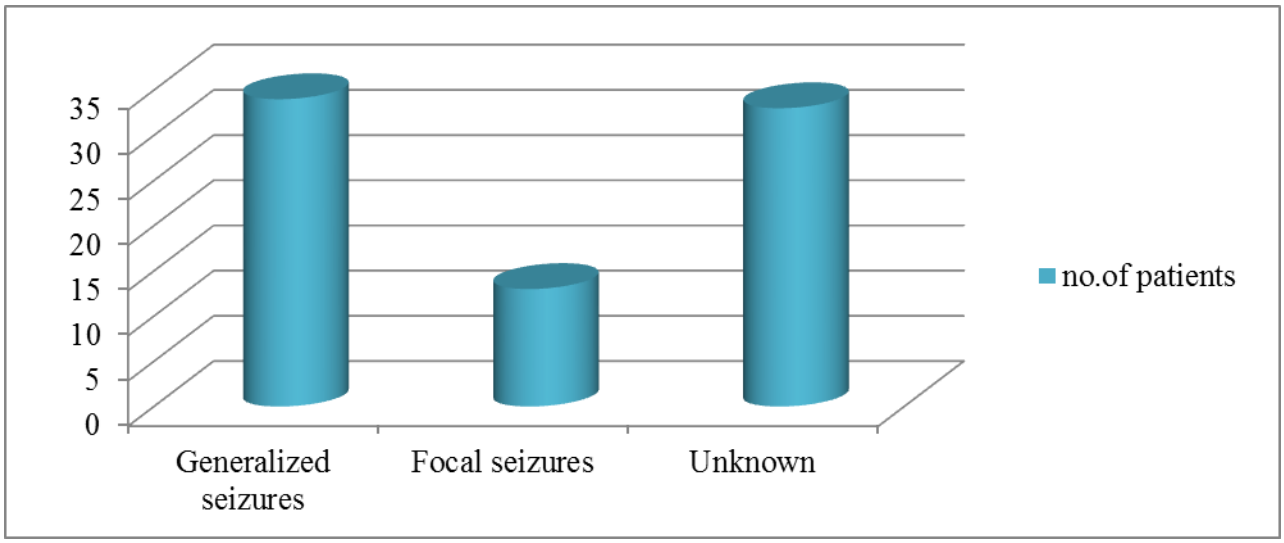

Fig 10: Types of seizure observed.

Table 10: Type of Treatment Used.

Type of treatment	No. of patients	Percentage
Monotherapy	14	
♣ **Phenytoin**	4	17.5%
♣ **Clobazam**	19	5%
♣ **Sodium valproate**	2	23.75%

♣ **phenobarbitone**		2.5%
Combination therapy ♣ **Dual therapy** ♣ **Triple therapy** ♣ **≥3**	26 8 7	32.5% 10% 8.75%

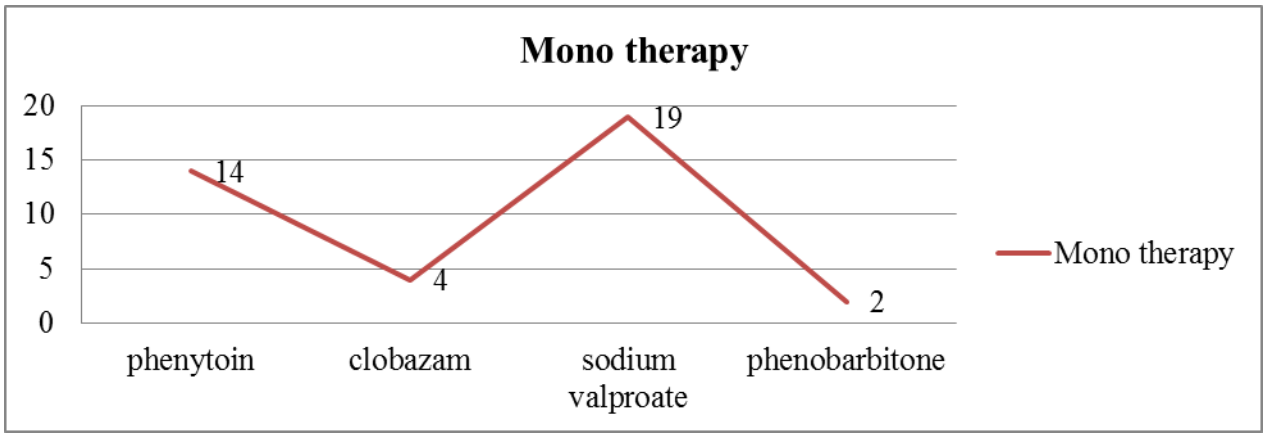

Fig11: Frequency of patients received mono therapy.

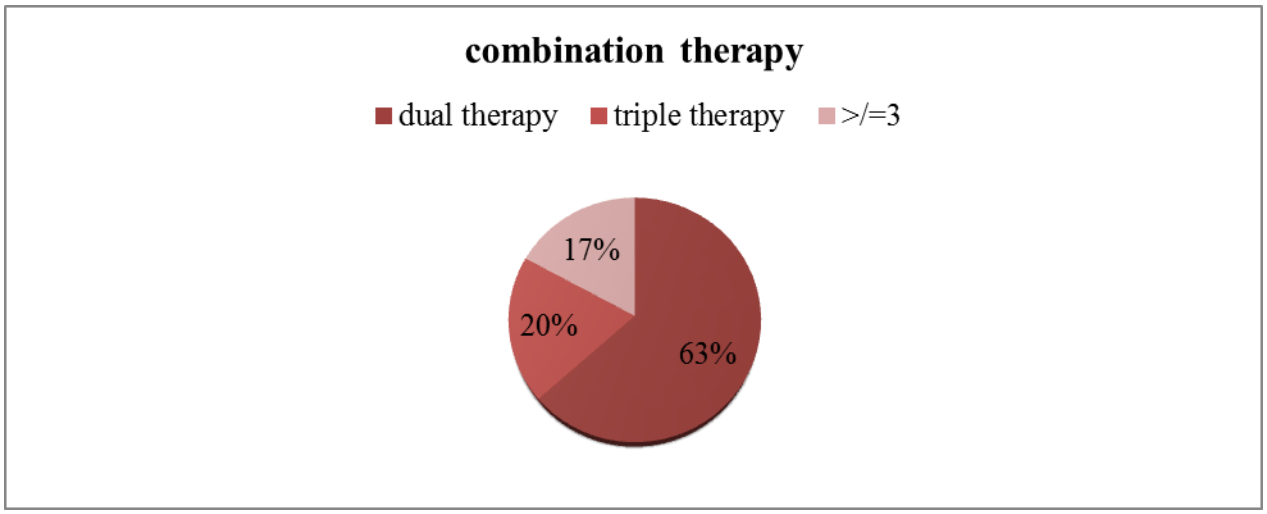

Fig12: Frequency of patients received combination therapies.

DISCUSSION

Age wise distribution of patients effected with seizures

Seizures have been found to have a higher incidence in younger children in many studies. Similar results were observed in our study where out of 80 subjects 15% (12) children experienced their seizure between the age group of 3 months to 1 year, 31.25%(25) children had their seizure among the age of 1year to 4 years, 17.5%(14) children experienced their seizure among the age group of 4years to 7years, 36.25%(29) children were among those who experienced their seizure among 7 years to 10 years.

The results of our study are similar to the following studies:

- ***Abla Albsoul-Younes,et al,2016, study showed that majority of the patients were younger than 12 years of age.***
- Hasan SS, et al, 2010, study showed that most of the recurrent cases were about 6-10 years age group.
- Ramjan Shaik, et al, 2015, study stated that most of the cases were about 1-12 months of age.
- Jincy George, et al, 2016, study stated that majority of the cases were reported under 11 years of age.
- Julie Thampi, et al, 2016, study reported that majority of the cases were below 4 years of age.

However in our study there is a slight increase in incidence of seizures in the age group of above 7 years which is a slight deviation from the findings of those authors which is not significant considering the variability in the studies.

Gender Wise Distribution of patients effected with seizures

Seizures have been found to be more common among males than females. Similar results were observed in our study where in out of 80 patients 75%(60) patients were males and 25%(20) patients were females.

The results of our study correlates with the following studies:

- Abla Albsoul-Younes, et al, 2016, study showed that majority of the seizure affected patients were males than females.
- Hasan S S, et al, 2010, study showed that most of the recurrent cases were male patients
- Ramjan Shaik, et al, 2015, study stated that most of the cases were males.
- Jincy George, et al, 2016, study stated that males were more effected with seizures than females.
- Julie Thampi, et al, 2016, study reported that majority of the cases were males.

Area of Residence of seizure affected patients

Seizures were found to be more common among rural sector when compared to urban sector people. Similarly in our study 66.25% (53) patients were from rural sector and 33.75%(27) patients were from urban sector.

Patients with Family History of Seizures

Seizures are somehow genetically transmitted from parents to their off springs. Similarly in our study out of 80 samples 16.25% (13) patients had family history of seizures.

Consanguinity among patient's parents

Consanguineous marriages among people are leading to congenital birth defects of their children. Similarly our study reports that out of 80 samples 25%(20) patient's parents had consanguineous marriages.

Seizure Episodes

Frequency of seizure episodes increases with age if not treated properly at the time of first attack. In our study out of 80 patients 36.25%(29) patients had only one seizure episode, 22.5%(18) patients had 1-2 episodes, 6.25%(5) patients had 2-4 episodes and 35%(28) had more than 4 episodes.

Seizure Associated With Fever

Fever should be properly monitored especially in children as it may lead to febrile convulsions and cerebral malaria. In our study we reported that out of 80 patients 38.75%(31) patients had seizures with fever and 61.25%(49) patients had no fever before seizure episodes.

Type of Seizure

Generalized tonic clonic seizures were the most common type of seizures seen in our study which is compatible with the findings of various other authors according to ILAE classification We observed the following types of seizures among the children 41.25%(33) children had the most common generalized seizures, 16.25%(13) had focal seizures, 42.5%(34) children had seizures of unknown category. So the most common type of seizures observed during our study period were generalized seizures followed by focal seizures and unknown category.

Other studies supporting our results include

- Rita Atugonza, et al, 2016 study stated that children with generalized seizures were more common followed by focal seizures.
- Hasan S S, et al, 2010 study stated reported that about 39% of the patients presented with generalized seizure.

- Amal bassili, et al, 2002 study stated that about 62.3% cases diagnosed were about generalized type.
- Ramjan Shaik, et al, 2015 study reported that majority of the cases reported were presented with generalized seizures.
- Jincy George, et al, 2016 study stated that There was large number of generalized seizures (51%) among our study subjects.

Type of Treatment Used

Management of seizures requires the use of antiepileptic drugs and selection of the antiepileptic drug depends on the type of seizure. Initially a single drug is given to abort the seizure and if not combination of AED's are given until the required therapeutic outcome is obtained. So based on the number of drugs used a therapy can be monotherapy or a combination therapy.

In our study monotherapy was found to be given in more patients compared to the combination therapy. Monotherapy was given in 48.75%(39) patients while a combination therapy is given in 51.25%(41) patients. Valproic acid was most widely used drug 23.75%(19) in children in mono therapy followed by phenytoin in 17.5%(14) children, clobazam in 5%(4) children and phenobarbitone in 2.5%(2) children. Where as in combination therapy dual therapy was mostly preferred in 32.5%(26) children then followed by triple therapy in 10%(8) children, followed by quaternary therapy and more in 8.75%(7) children. In the combination therapy the most effective combination was found to be sodium valproate with phenytoin and carbamazepine with sodium valproate.

The studies supporting our results include:

- Abla Albsoul-Younes, et al, 2016, study showed that old generation AED's were mostly used when compared to new generation AED's. Most frequently used drug as monotherpy was from old generation AED. Their study also reported that valproic acid was most frequently used AED followed by carbamazepine. Dual therapy include combinations like valproic acid with carbamazepine and carbamazepine with levetiracetam.
- Rita Atugonza, et al, 2016, study reported that Sodium valproate has demonstrated efficacy in the treatment and children were managed on dual therapy using sodium valproate with carbamazepine.

- Hasan S S, Bahari, et al, 2010 study stated that most frequent dual combination was found to be sodium valproate with carbamazepine and sodium valproate with phenytoin.
- Ramjan Shaik, et al, 2015 study stated that for the management of seizures, monotherapy was found to be the most preferred choice of treatment and in this phenobarbitone was the preferred drug of choice followed by phenytoin. In the dual and poly therapies phenytoin was given with carbamazepine and valproate with carbamazepine.
- Maity Net al, 2011, study stated that majority of the patients were on valproate and carbamazepine and poly therapy was managed by using valproate wth carbamazepine.
- Julie Thampiet al, 2016, study stated that sodium valproate was frequently as mono-therapy followed by benzodiazepine, phenytoin and carbamazepine. Phenytoin with clobazam was the most common two drug combinations.

CONCLUSION

- We found that seizure effected patients were more among the age group of 7 -10 years and males were more effected when compared to females.
- The number of patients with seizures came more from rural areas than urban sectors.
- Generalized seizures were more common among children.
- The treatment strategy was followed by using mono therapy and combination therapies.
- In mono therapy Sodium valproate was most widely used drug followed by phenytoin and clobazam and phenobarbitone.
- Combination therapy included dual, triple and quaternary or more. In combination therapy most widely used combination was sodium valprate with carbamazepine and sodium valproate with pheyntoin was used.
- Overall we found that with the proper diagnosis at the first seizure episode itself helps in reducing the recurrent seizure episodes. We also concluded that diagnosing at the first episode also helps in reducing the seizures by using mono therapy than dual or triple therapies.

REFERENCES

1. Pediatrics [Internet]. En.wikipedia.org. 2018 [cited 24 January 2018]. Available from: https://en.wikipedia.org/wiki/Pediatrics
2. Kliegman R, Stanton B, St. Geme J, Schor N, Behrman R. Nelson textbook of pediatrics. 19th ed. philadelphia: Elsevier, a division of Reed Elsevier india private limited.

3. ilae classification of seizures - Google Search [Internet]. Google.co.in. 2018 [cited 25 January 2018]. Available from :https://www.google.co.in/search?q=ilae+classification+of+seizures&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiJ5uPl0vPYAhUESI8KHTJdAxQQ_AUICigB&biw=1366&bih=637#imgrc=AjehE-XCe8g8LM:
4. Causes of a Seizure | The Johns Hopkins Epilepsy Center [Internet]. Hopkinsmedicine.org. 2018 [cited 24 January 2018]. Available from: https://www.hopkinsmedicine.org/neurology_neurosurgery/centers_clinics/epilepsy/seizures/causes/index.html
5. Seizures in Children: Types, Symptoms, Causes & Treatment [Internet]. EMedicine Health. 2018 [cited 25 January 2018]. Available from: https://www.emedicinehealth.com/seizures_in_children/article_em.htm#what_causes_seizures_in_children
6. Seizures - Symptoms and causes [Internet]. Mayo Clinic. 2018 [cited 24 January 2018]. Available from: https://www.mayoclinic.org/diseases-conditions/seizure/symptoms-causes/syc-20365711
7. Adhikari S, Sathian B, Koirala DP, Rao KS. Profile of children admitted with seizures in a tertiary care hospital of Western Nepal. BMC Pediatr., 2013; 13: 43. PubMed | Google Scholar.
8. Eli M. Neonatal Seizures and neonatal epileptic syndromes. Neurol Clin Epilep., 2001; 19(2): 427-56.
9. David P, De Vivo DC. The nervous system. In: Rudolph Colin D. Abraham D. Rudolph, Margaret K. Hostellter, 21st edi. New York: McGraw Hills, 2002: 2267.
10. Banerjee PN, Filippi D, Allen Hauser W. The descriptive epidemiology of epilepsy-a review. Epilepsy Res., 2009; 85(1): 31- 45.
11. Christopher FL, Westermeyer RR. Seizures in children. emedicinehealth.com
12. Hamdy NA, Ginby D, Feltbower R, Ferrie CD. Ethnic differences in the incidence of seizure disorders in children from Bradford, United Kingdom. Epilepsia, 2007; 48(5); 913–916.
13. Sillanpää M, Shinnar S. Long-term mortality in childhood-onset epilepsy. N Engl J Med., 2010 23; 363(26): 2522-9.
14. Hauser WA. The prevalence and incidence of convulsive disorders in children. Epilepsia, 1994; 35(2): 1-6. PubMed | Google Scholar

15. Chung B, Wat LC, Wong V. Febrile seizures in southern Chinese children: incidence and recurrence. Pediatr Neurol., 2006 Feb; 34(2): 121-6. PubMed | Google Scholar.
16. classification of anti epileptic drugs - Google Search [Internet]. Google.co.in. 2018 [cited 25 January 2018]. Available from: https://www.google.co.in/search?biw=1366&bih=588&tbm=isch&q=classification+of+anti+epileptic+drugs&backchip=online_chips:algorithm&c.
17. Epilepsy and Seizures: Practice Essentials, Background, Pathophysiology [Internet]. Emedicine.medscape.com. 2018 [cited 25 January 2018]. Available from: https://emedicine.medscape.com/article/1184846-overview.