

CLINICO-ETIOLOGICAL PROFILE OF FIRST EPISODE OF SEIZURE AND ITS CORRELATION WITH ELECTROENCEPHALOGRAM AND IMAGING SPECTRUM IN CHILDREN AGED ABOVE 5 YEARS OF AGE IN A TERTIARY CARE HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY



Paediatrics

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ABSTRACT

Seizures, a transient occurrence of signs and/or symptoms resulting from abnormal excessive or synchronous neuronal activity in the brain [1, 2]. Seizure is one of the commonest neurological illnesses. About 4-10% of children experience at least one episode in the first 16 years of life. Where 1/5th of total children with unprovoked seizures may develop epilepsy. Risk is approximately 20% if neurological examination, electroencephalogram (EEG) and neuroimaging is normal [1]. EEG abnormalities can be detected in up to 59% of children with first afebrile seizure and can identify subtle focality in presence of normal magnetic resonance imaging of brain [1]. Neuroimaging has an important role in children with focal seizure, persistent seizure activity, focal neurologic deficit, neurocutaneous disorder etc. Right assessment and scrutiny of first seizure is crucial, not only for abortion of acute attack but also for long term control of epilepsy. **Aim and methods-** The objective of the study is to determine the age of onset, etiology of first episode of seizure in children between the age group of above 5 years to 15 years and the pattern of EEG changes and MRI findings in the above group of children. In a prospective single centre observational study at GIMS GADAG, around 60 children who were admitted with first episode of seizure at age group of above 5 years to 15 years to our emergency department between October 2021 to July-2022 (10 months) were studied. Seizures defined using international league against epilepsy (ILAE). EEG and MRI were done in all 60 children and their records were analysed. **Results-** A total of 60 children presenting with first episode of seizures were included in the study. 9-12 year age group were major portion of our study with male gender predominance. Generalized seizures were more common accounting for 78%. Idiopathic seizure was the most common etiology identified (40%), followed by meningitis (27%) and other causes. EEG abnormality was seen in 50% of the children.

KEYWORDS

Afebrile seizure, EEG, Meningitis.

INTRODUCTION

Seizures are defined as a transient occurrence of signs and symptoms due to the abnormal, excessive or synchronous neuronal activity in the brain characterized by abrupt and involuntary skeletal muscle activity^[1,13].

They account for 1% of all emergency department visits^[1, 13]. Seizure is one of the commonest childhood neurological illnesses. About 4-10% of children experience at least one episode of seizure in the first 16 years of life^[2,7]. Incidence of first episode of seizure is highest in children less than 3 years of age^[9,12]. The cumulative lifetime incidence of epilepsy is 3% and more than half of the disorders start in childhood.

Approximately 30% of patients who have 1st afebrile seizure later develop epilepsy.

Risk is 20% if neurologic examination, EEG and neuroimaging is normal.

Febrile seizures occurring commonly between 6 months and 5 years of age account for 2-5% of all children experiencing first episode of seizure before 5 years of age.

Central nervous system infections are the main cause of seizures and acquired epilepsy in the developing world^[1]. Acute symptomatic or provoked seizures occurs secondary to an acute problem affecting brain excitability such as electrolyte imbalance. However, sometimes these seizures signify major structural, inflammatory or metabolic disorders of brain such as meningitis, encephalitis, brain tumor^[14].

EEG abnormalities can be detected in up to 59% of children with first afebrile seizure and can identify subtle focality in presence of normal magnetic resonance imaging of brain^[1,15].

Neuroimaging has an important role in children with focal seizures, persistent seizure activity, focal neurologic deficit, neurocutaneous disorder, signs of elevated intracranial pressure, VP shunting, trauma, or travelling to cysticercosis endemic countries.

Right assessment and scrutiny of first seizure is crucial, not only for abortion of acute attack but also for long term control of epilepsy.

Hence the study is undertaken with objective of ascertaining the etiology, clinical profile and its correlation with EEG and neuroimaging in children presenting with first episode of seizures at

GIMS, Gadag, tertiary hospital.

AIM AND METHODS

The objective of the study is to determine the age of onset, etiology of first episode of seizure in children between the age group of above 5 years to 15 years and the pattern of EEG changes in the above group of children.

In a prospective single centre observational study at GIMS GADAG, around 60 children who were admitted with first episode of seizures at age group of above 5 years to 15 years to our emergency department between October 2021 to July-2022 (10 months) were studied. Seizures defined using international league against epilepsy (ILAE). EEG and MRI was done in all 60 children and their records were analysed.

Inclusion Criteria

- Study population included 60 children in the age group of 5 years to 15 years with onset of 1st episode of seizure

Exclusion Criteria

- Simple febrile seizure,
- Head injury
- Known case of developmental delay
- Hypocalcemic or hypoglycemic or dyselectrolytemia causing convulsions
- Known case of inborn error of metabolism

METHODOLOGY

- Prior to inclusion of children in the study detailed history of presenting complaints like onset of seizures, type of seizures, duration of seizures, past history and family history were analysed.
- General physical examination and neurological examination was done in detail.
- Biochemical investigations like complete hemogram, serum electrolytes and blood glucose reports were obtained.
- EEG and MRI was done for all cases.
- Lumbar puncture for cerebrospinal fluid analysis was done as and when required.
- Children were classified based on latest guidelines of ILAE and started on antiepileptic drugs accordingly.

RESULTS

In our study 60 children were included. Children from the age group of 9-12 Years formed majority with 54% and least was 12-15 years. 30% of children were of 5-6 years. 16%. In our study, male predominance was seen, out of 60 patients 36 were males and rest were females.

In our study majority of children did not have significant family history, around 13% of children had positive family history.

Table 1- Number Episode Of Seizures At The Time Of Admission

NUMBER OF EPISODES	FREQUENCY	PERCENTAGE
1 EPISODE	15	25
2-5 EPISODE	39	65
STATUS	6	10
TOTAL	60	100

Majority of patients presented with 2-5 episodes at the time of presentation accounting for 65%, around 25% presented with 1 episode of seizures.

Table 5- Types Of Seizures

TYPE	FREQUENCY	PERCENTAGE
GENERALIZED	47	78
FOCAL	13	22
TOTAL	60	100

In our study generalized seizure was the most common type of seizure which accounted 78% and focal seizures were of around 22%.

EEG Finding In A Case Of First Episode Of Seizures

Our of 60 children 50% of them did not show any EEG changes, around 28%, 18% and 4% respectively showed Generalized, focal and temporal discharge

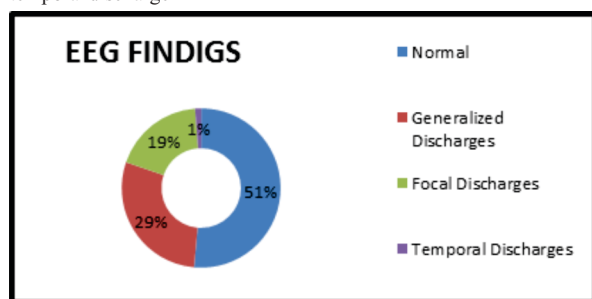


Figure 1- EEG Finding In A Case Of First Episode Of Seizures

Table 7- MRI Finding In A Case Of First Episode Of Seizures

MRI FINDING	FREQUENCY	PERCENTAGE
NORMAL	40	66
TUBERCULOMA	2	3.5
GLIOSIS /SEQUELAE OF VASCULAR INSULT	8	13
ARACHNOID CYST	1	02
MESIAL TEMPORAL SCLEROSIS	2	3.5
POSTERIOR REVERSIBLE ENCEPHALOPATHY SYNDROME	7	12

Around 66% of children showed normal MRI brain.

Etiology Of First Episode Of Seizures

Majority of patients were idiopathic, accounting for 40%. Second most common etiology found in our study was meningitis or encephalitis accounting for 27%.

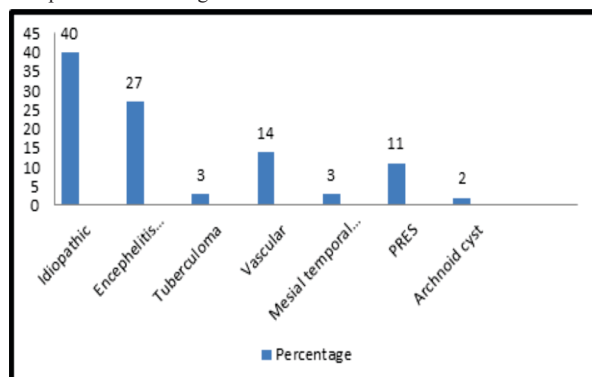


Figure 8- Etiology Of First Episode Of Seizures

DISCUSSION

In this study male to female ratio 1.5:1, which was comparable with study done by Rupa DSet all (2016) ^[1,2,4,5]. Seizures occurrence commonest in age group of 9 years to 12 years as compared to 5 -9 years and 12-15 years, as this age group diagnosed with CNS infection and Idiopathic epilepsy.

Generalized seizures of which is most common type followed by focal, which was comparable with study done b Hauser WAet all in 2008 ^[1,2,4,5]. But a study conducted by Adhikari S et al in 2013, in which proportion of patient with absence seizures was higher in other studies ^[11].

10 % of our patient had status epilepticus, while some studies reported 8%^[2], 10.9%^[13], 7.3%^[11] and 7.5%^[11] which was comparable to our study, while other ^[3] study reported 0.3% status epilepticus.

Etiological analysis revealed idiopathic epilepsy to be commonest cause seizures in pediatric age group followed by infection followed by as sequelae of old infarcts or vascular causes, which is similar to studies conducted by Muniswamappa et al who conducted study in 2021^[1]. While most of studies included febrile seizures as part of study so most common etiology being febrile seizure ^[3,4,5].

CNS infection was second most common cause of seizures, in which viral infections were common followed by pyogenic then by tuberculosis.

Worldwide literature reveals that abnormal neuroimaging seems to be more associated with focal seizures than generalized seizures. we too observed the same.

Abnormal EEG finding was upto 50 % where other studies revealed 58% (in a study conducted by Muniswamappa et al (2021)^[1]. EEG findings were around 22%^[2] and 48%^[10]; in other studies which are comparable to our studies.

While idiopathic seizures had best outcome without neurological deficit along with hypertensive encephalopathy.

CNS infections need to be more focused because of highest morbidity and mortality.

Limitations

our study had a smaller sample size. As small sample, our study is associated with selection bias, hence we need large sample with proper randomization study for better understanding. There was no follow up in my study so, morbidity or mortality profile of patients are being missed out.

CONCLUSION

A total of 60 children presenting with first episode of seizures were included in the study. 9-12 year age group was major portion of our study with male gender predominance. Generalized seizures were more common accounting for 78%. Idiopathic seizure was the most common etiology identified (40%), followed by meningitis (27%) and other causes. EEG abnormality was seen in 50% of the children.

MRI brain may be normal in but child may have EEG abnormality. EEG abnormalities aids in decision of starting antiepileptic drugs in first episode of afebrile seizure. First episode of any seizure can leave behind huge mental and physical consequence to the child and family. Hence the right assessment and scrutiny is crucial, not only for abortion of acute attack but also for long term control of epilepsy.

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