

Original Research Article

A study of clinical, etiological and neurodevelopmental profile of epilepsy in children aged 0-5 years

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ABSTRACT

Background: Seizures constitute the most common neurological problem in children. Appropriate diagnosis and management of childhood epilepsy is essential to improve quality of life in them. Objectives of the study were to study the clinical and etiological profile of early childhood epilepsy and its effect on neurodevelopment.

Methods: This was a time bound study; duration being one year from September, 2018 to September 2019. All new patients with acute seizures or status epilepticus admitted in paediatric emergency ward were evaluated and those meeting inclusion criteria were enrolled. On the basis of history, neurological and systemic examination and available investigations primary diagnosis of epilepsy was reached. Neurodevelopmental parameters like vision, hearing, and DQ were assessed. EEG was done in all patients. Other relevant investigations like neuroimaging were carried out when indicated. Collected data was analysed in form of frequency and percentage.

Results: A total of 52 patients were enrolled. 60% patients were younger than 2 years. Maximum patients had generalised convulsions; generalised tonic-clonic being the most prevalent. 38% patients had significant perinatal complications like perinatal asphyxia, pyogenic meningitis and kernicterus. Fifty per cent patients had delayed milestones and half of those had severe delay. 67% had abnormal EEG and 20 patients had abnormal neuro-imaging findings. The most common etiologies for epilepsy were hypoxic ischaemic encephalopathy, idiopathic, epilepsy syndromes, metabolic disorders and CNS infections.

Conclusions: Majority of early childhood epilepsy is a result of either genetic conditions or perinatal events. They have neurodevelopmental and behavioural associations. While treating epilepsy all these factors should be considered in order to ensure a near-normal life for these patients.

Keywords: Epilepsy, Paediatrics, Neurodevelopmental profile

INTRODUCTION

Seizures constitute the most common neurological problem in children and the majority of epilepsy has its onset in childhood. Appropriate diagnosis and management of childhood epilepsy is essential to improve quality of life in these children.¹

ILAE (International league against epilepsy) defines epilepsy as a disease of the brain having any of the

following conditions: 1. At least two unprovoked (or reflex) seizures occurring >24 hours apart, 2. One unprovoked (or reflex) seizure and a probability of further seizures similar to the general recurrence risk after two unprovoked seizures (at least 60%), occurring over the next 10 years and 3. Diagnosis of the epilepsy syndrome.²

According to the world health organization (WHO), of the 50 million people with epilepsy worldwide, 80% reside in developing countries. Epilepsy was estimated to

account for 0.5% of the global burden of disease, accounting for 7,307,975 disability adjusted life years (DALYs).

A paediatric epilepsy study from Mumbai (using 1981/1989 classification) reported 55.3% partial, 27% generalized, 13.5% undetermined, and 4.1% specific epilepsy syndromes.⁵ In a study of 123 children with “difficult-to-control” epilepsy, onset below 2 years of age, male sex, other neurological abnormalities, and certain seizure types emerged as risk factors for refractoriness. Perinatal insults seem to predominate the etiological spectrum. They contributed to about 50% of symptomatic epilepsies with onset in the first 3 years of life in the study.

Epilepsy can adversely affect a child's education. Epilepsy which is well controlled by proper anti-epileptic medication would reduce absenteeism and help the child to achieve a normal daily routine.

Major part of brain development occurs during early childhood. Diseases causing childhood epilepsy also affect neurodevelopment, so along with treatment of epilepsy, development also has to be assessed and intervention done if required.

Childhood epilepsy is often associated with other comorbidities like autism, attention deficit/hyperactivity disorder (ADHD), behavioural abnormalities. So, identifying them early and prompt treatment of all ailments can give child normal to near normal life.

Aims and objectives

Aim and objectives of the study were to study clinical spectrum and etiological factors of epilepsy, to document the findings of available investigations like EEG, neuroimaging in epilepsy and to assess associated comorbidities like neurological disability, behavioural abnormalities, developmental delay at time of enrolment.

METHODS

The study design was observational-cross sectional study.

This was a time bound study. Duration of study was 1 year. All the patients coming to epilepsy clinic, S.S.G. hospital, Baroda and fulfilling inclusion criteria were enrolled in the study. Study period was from September, 2018 to September 2019.

Population under study comprised of patients visiting paediatric epilepsy clinic in SSG hospital, Vadodara fulfilling inclusion and exclusion criteria.

Inclusion criteria

The inclusion criteria for the study included the children should be less than five years of age, the child should

have epilepsy as per ILAE (International league against epilepsy) operational definition and the child should be hemodynamically stable.

Exclusion criteria

The exclusion criteria excluded children with provoked seizures and children with single episode of convulsion.

All new patients with acute seizure or status epilepticus admitted in paediatric emergency ward meeting inclusion and exclusion criteria were referred to epilepsy clinic and were evaluated there. New patients with history of 2 unprovoked seizures and age less than 5 years coming to paediatric OPD were enrolled in epilepsy clinic during the study period. On the basis of careful history taking, proper neurological and other systemic examination and available investigations primary diagnosis of epilepsy was made.

A written and informed consent about enrolment in the study was taken and confidentiality was maintained about the patient's details.

General development in form of gross and fine motor milestones, social milestones, and language milestones was assessed in all patients. Neuro development in form of visual assessment, hearing assessment, and IQ assessment/ DASII (Development assessment score for Indian infants) was assessed.

Statistical analysis

Collected data was analysed using Microsoft excel, 2010 in form of frequency and percentage.

RESULTS

Age wise distribution

As can be seen from above Figure 1, 60% patients were of age less than 2 years. The youngest infant enrolled in study was 4 months old and oldest child was 5 years old. 21% patients were enrolled in 1st and 29% in 2nd year, 17% in 3rd year, 25% in 4th year, 8% in 5th year of life.

Gender wise distribution

In our study, 69% patients were male and 31% patients were female. It clearly indicates male preponderance in comparison to female. Male to female ratio in our study was approx. more than 2:1 (exactly 2.25:1).

Type of seizure

Out of 52 patients, 36 patients (69%) had generalized seizures and only 16 patients (31%) had focal seizures. 26 patients (50%) had generalized tonic clonic type of seizure which is highest in all seizure types. 4 patients (7%) had generalized tonic convulsion, 1 patient (2%)

had generalized clonic convulsion, 2 patients (4%) had generalized myoclonic convulsion, 3 patients (6%) had infantile spasms, 15 patients (29%) had focal convulsion and 1 patient (2%) had focal seizure evolving to bilateral convulsion.

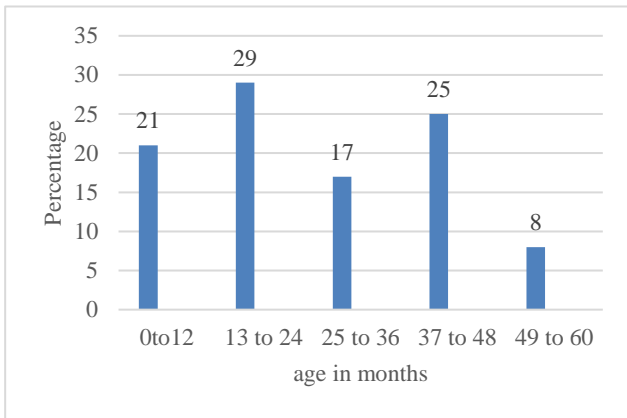


Figure 1: Age of the patient at time of enrolment.

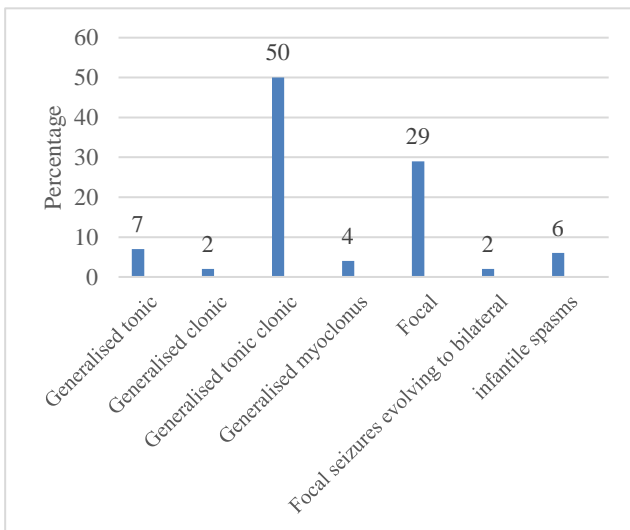


Figure 2: Type of seizure in epilepsy patients.

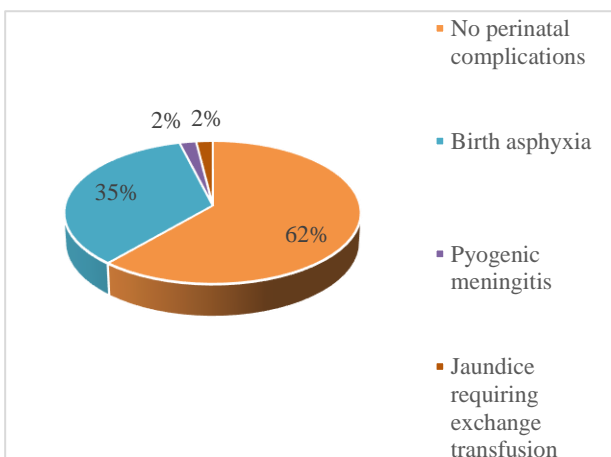


Figure 3: Perinatal complications and epilepsy.

In our study, 4 patients (8%) had positive history of seizure in family members. Rest 48 patients didn't have positive family history. Ahmed et al in Dhaka in 2010 found positive family history in 16% patients.²⁹ Gupta et al in Gujarat also found positive family history in 3.36% patients.

Out of 52 patients 47 patients (90%) were born by normal vaginal delivery, 4 patients (8%) by caesarean section and 1 patient (2%) were born by assisted vaginal delivery. 20 patients (38%) had normal birth weight (2.5 to 4 kg), while 23 patients (45%) had Low birth weight, 1 patient (2%) had birth weight more than 4 kg and birth weight was not known in 8 patients (15%). Low birth weight babies include preterm babies and full term small for date babies. Preterm babies have more chances of sepsis and pyogenic meningitis which can cause epilepsy eventually. While perinatal asphyxia is more common in small for date babies which can cause epilepsy in later age.

Perinatal complications and epilepsy

The 20 patients (38%) had significant perinatal complications while 32 patients (62%) did not. 18 patients (35%) had history of perinatal asphyxia, 1 patient had history of pyogenic meningitis and 1 patient had history of kernicterus.

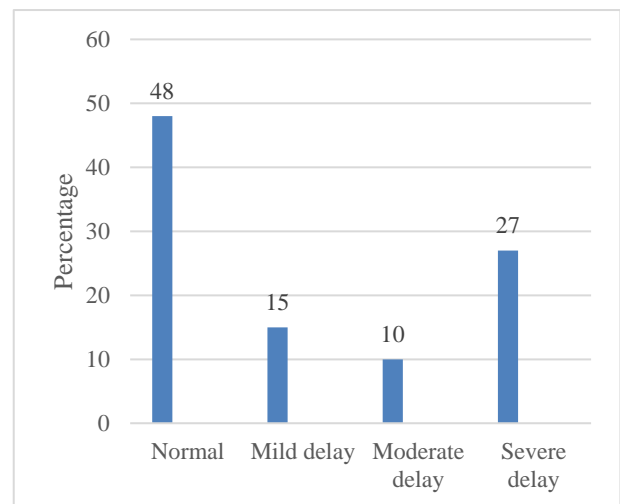


Figure 4: Social milestones in epilepsy patients.

Examination of the patients revealed normal nutritional status in most of the patients. 19 patients had moderate to severe wasting. 14 patients (27%) had abnormal CNS examination, mostly tone abnormalities (spasticity). 38 patients (73%) had normal CNS examination.

Out of 52 patients, 20 patients (38%) had microcephaly and rest 32 patients (62%) had normal head circumference. Perinatal insults lead to decreased brain growth and later on it leads to epilepsy and developmental delay.

Developmental assessment in epilepsy

The 25 patients (48%) had normal social milestones and 27 patients (52%) had development delay in social milestones. 8 patients (15%) had mild delay, 5 patients (10%) had moderate delay and 14 patients (27%) had severe delay in social milestones. 15 patients (29%) had speech difficulties while 37 patients (71%) had normal speech development.

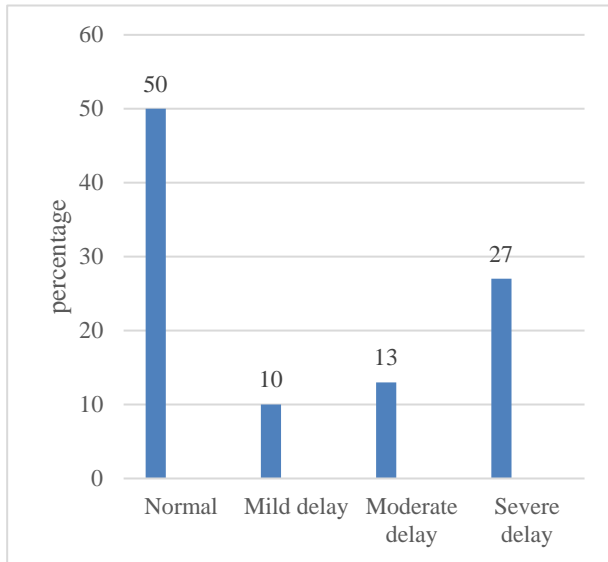


Figure 5: Motor milestones in epilepsy patients.

The 26 patients (50%) had normal motor milestones and 50% had delay in motor milestones. 5 patients (10%) had mild delay, 7 patients (13%) had moderate delay and 14 (25%) patients had severe delay in motor milestones.

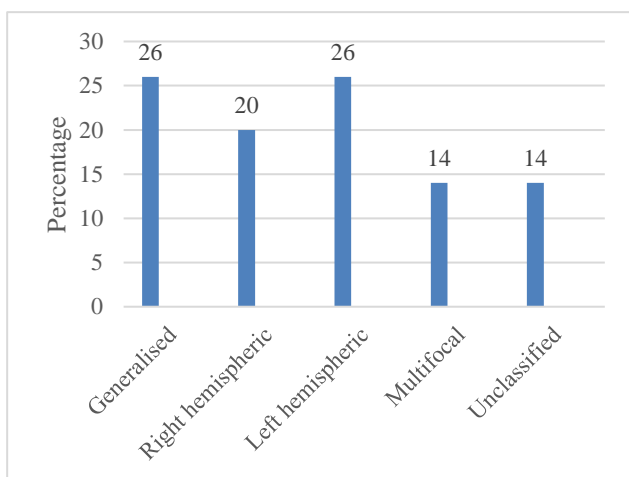


Figure 6: Epileptic discharge onset in EEG.

Behavioural problems in epilepsy patients

Out of 52 patients, 1 patient (2%) was diagnosed with ADHD and 3 patients (6%) had Autistic behaviour. Rest 48 patients (92%) had normal behaviour.

Hearing and visual assessment was done which revealed that, 2 patients (4%) had impaired hearing due to bilateral severe sensory neural hearing loss (SNHL). 3 patients (6%) had impaired vision having optic atrophy or very high refractory errors.

Out of 52 patients, 35 patients (67%) had abnormal EEG and 17 patients (33%) had normal EEG.

Out of 35 abnormal EEGs, 9 (26%) EEG had generalized discharges and left hemispheric discharges each. 7 patients' (20%) EEG had right hemispheric discharges, 5 patients' (14%) EEG had multifocal discharges while 5 patients' (14%) EEG had non-specific discharges. Epileptic discharges from left hemisphere were more than right hemisphere. 5 (14%) EEGs were suggestive of epileptic encephalopathy, 1 (3%) EEG was showing spikes and wave pattern. 3 EEGs (9%) had hypsarrhythmia and 3 EEGs (9%) had non-specific findings All EEGs were done in interictal phase.

Out of 52 patients, neuro-imaging in form of CT or MRI brain was done in 31 patients (60%) out of which 20 patients had abnormal neuro-imaging findings while 11 patients had normal findings.

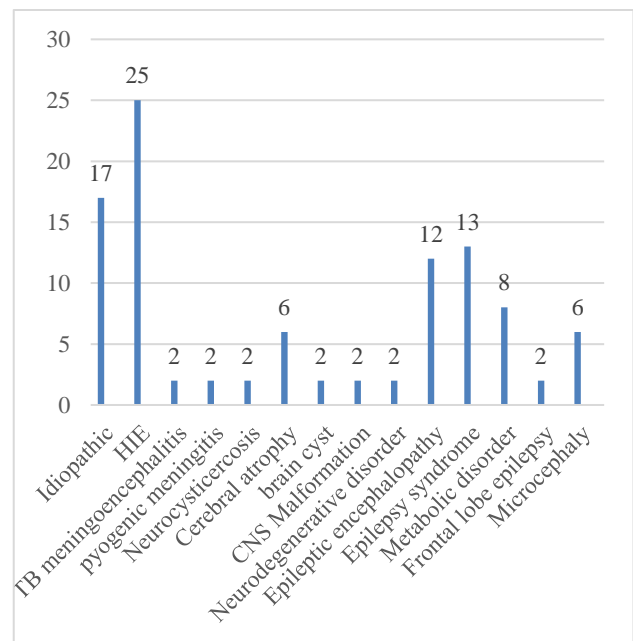


Figure 7: Etiological profile in epilepsy patients.

Etiology of epilepsy

The most common etiology was hypoxic ischaemic insult as sequelae of perinatal asphyxia which was seen in 13 patients. Epilepsy syndromes like epileptic encephalopathy, Dravet syndrome, West syndrome also formed a major chunk (25%). Metabolic and neurodegenerative disorders, infectious causes like bacterial and tuberculous meningitis, neurocysticercosis were seen in a few patients. In 19 patients no cause was

found. They could be attributed to idiopathic or genetic epilepsies.

Treatment in epilepsy

The drug used most frequently to treat epilepsy was sodium valproate followed by carbamazepine and phenobarbitone. The 50% patients (25) required newer anti-epileptic drugs as an 'add on' therapy or alternative drug. Clobazam and levetiracetam were 2 common newer anti-epileptic drugs used in these patients.

DISCUSSION

A number of studies similar to ours were conducted in developing countries. They show a similar incidence of epilepsy in the infantile and early childhood period.

In a study done by Ahmed et al in Dhaka, Bangladesh in 2010, majority cases were in the age group of first 2 years.²⁹ Iqbal et al in 2016 also found higher incidence of seizures in younger age group of children and a decreasing trend in older ones.

The type of epilepsy in this age group is predominantly generalised. This may be so because the etiologies of epilepsy in these patients are mostly structural, genetic, metabolic or a sequela of hypoxic and hypoglycaemic insults; which tend to have a generalised distribution.

Gupta et al in Ahmedabad, Gujarat also found that majority of patients had generalized tonic clonic seizures (71.71%), followed by complex partial seizures (12.79%).¹⁵ Khreisat et al in 2005 in Karak, Jordan found that 71% patients had generalized seizures and rest 29% had partial seizures. Generalized tonic clonic seizure was the most common type.¹⁶ Similar findings were noted by Ahmed et al and Iqbal et al.^{14,17}

In our study, EEG was abnormal in majority of patients. All EEGs were done in interictal period. According to Gupta et al 8.98% patients had normal EEG records, while 77.35% had abnormal EEG records. Out of 212 patients, EEG discharges were generalized in 148 patients, localized to right side in six and to left side in ten patients, 24 patients had non-specific changes.¹⁵ According to Khreisat et al normal EEGs were found in 18% patients. Generalized discharges were present in 34% patients.¹⁶ According to Ahmed et al, EEG was normal in 38% patients, 62% patients had abnormal EEGs.²⁷ These shows that EEG is an important diagnostic tool in paediatric epilepsy.

According to Russ et al, children with current reported epilepsy or seizure disorder were significantly more likely than those never diagnosed to experience depression (8% vs 2%), anxiety (17% vs 6%), ADHD (23% vs 6%), conduct problems (16% vs 3%), autism/autism spectrum disorder (16% vs 1%) and headache (14% vs 5%).²⁸

They had greater risk of limitation in ability to do things, repeating a school grade, poorer social competence and greater parent aggravation, and were at increased risk of having unmet medical and mental health needs.²⁸

Our patients were of very young age majority less than 2 years, so formal behavioural assessment was not possible, but at later age they may develop behavioural problems. Exact incidence of patients with behavioural problems may be higher.

Limitations

Because of financial constraints, neuroimaging could not be carried out in all patients. Investigations for genetic epilepsy could not be carried out in patients with difficult to control seizures and epilepsy syndromes. If these investigations are available greater light can be shed upon the etiological profile of childhood epilepsy.

CONCLUSION

Childhood epilepsy is an important cause of morbidity, especially in developing countries. It has impact on daily life activities as well as neurodevelopmental and behavioural outcomes. Early diagnosis, optimum management using anti-epileptic drugs as well as management of associated neurological conditions would go a long way in improving quality of life in these patients.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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