Original Research Article

A study of clinical and EEG patterns in patients with Idiopathic generalized epilepsy

Soni Girish[1], Jagiasi Kamlesh[2*], Singh Rakesh[3], Chheda Akash[4], Kadam Nikhil[4], Ansari Afroz[4]

[1]Associate Professor, [2]Professor, [3]Assistant Professor, [4]Resident, Department of Neurology, Grant Govt. Medical College and Sir JJ Group of Hospitals, Byculla, Mumbai 400008.
Email: kamleshjagiasi@yahoo.com

Abstract

Background: Idiopathic generalized epilepsies (IGE) are a group of disorders in which EEG shows generalized, bilateral, synchronous, symmetrical spike wave complex and constitute one third of all epilepsies. Patients with IGE have normal neurological status in inter-ictal period and no abnormality on brain imaging. Inter-ictal EEG shows normal background and generalized discharges such as spikes, polys-pikes, poly-spike/spike and waves. [1]In developing countries like India, focal seizures due to Tuberculoma, Neurocysticercosis and scar are common, but idiopathic generalized epilepsy still forms a measurable bulk contributing to seizure morbidity. IGE can have focal discharges in addition to generalized discharges adding to the confusion.[2] Thus, it is important to know about the clinical and EEG features of IGE, as treatment and prognosis varies. **Aims and Objectives:** To study clinical and EEG patterns in patients with Idiopathic Generalized Epilepsy. **Methodology:** This was a cross-sectional retrospective study in patients with Idiopathic Generalized epilepsy at the Department of Neurology at tertiary health care center during one year period i.e. January 2016 to January 2017 as regards to their seizure types, EEG patterns and syndromic epilepsy diagnosis. Sleep and Awake EEG were done for at least 30 minutes. Those with normal EEG on first time; underwent repeat sleep and awake EEG for 60 minutes. The data was presented in the tabular form and expressed in percentages. **Results:** 65 patients with IGE above the age of 5 years were included in the study. The majority of the patients were in the age group of 16-30 years (44.62%), followed by 31-45 years (23.07%); 6-15 years (18.46%); 46-60 years (13.84%); Females (61.54%) were more affected than males (38.46%). Various types seizure patterns were GTCS alone in 23.08% followed by Absences alone in 20.00%, GTCS + myoclonic jerksin 13.85%, GTCS + absences in 12.31%, Myoclonic jerks in 7.69%, Absences and myoclonus in 6.15%, GTCS + absences + myoclonic jerks in 6.15%, Atonic drop in 4.62%, Atonic drop and myoclonic jerks in 3.08%, Atonic drop and absence in 3.08%. EEG pattern was Abnormal in 81.54% and normalin 18.46% even with repeated EEG studies. Focal discharges were seen in 32.30% of patients, predominantly from fronto-central region. The focal discharges were unilateral in 71.42% cases and were synchronous bilateral in the remaining 28.57%.Occipital rhythmic intermittent delta activity (ORIDA) was seen in 15.4% patients. Photic stimulation accentuated discharges in all 14 patients with JME whereas hyperventilation induced discharges in 92.3%of childhood absence epilepsy. Abortive generalized bursts of discharges (<2 seconds) constituted 53.08% of abnormal generalized EEG pattern whereas in the remaining 46.92%, bursts were more than 2seconds. Poly-spike, spike wave discharges were seen exclusively with JME. **Conclusions:** It can be concluded from our study that the majority of the patients were in the age group of 15-30 and majority were females. Most common seizure types were GTCs alone followed by absences alone followed by GTC + myoclonic jerks. Focal discharges can be seen with IGE, mostly from the frontocentral region. Also ORIDA can be seen in generalized epilepsy particularly CAE. Polyspike discharges are exclusively seen with JME.

Key Words: EEG (Electro Encephalography), GTCS (Generalized Tonic Colonic Seizure), Myoclonic jerks, Absence.

[*]**Address for Correspondence:**
Dr. Jagiasi Kamlesh, 4th floor, Main hospital building, Department Neurology, Grant Govt. Medical College and Sir JJ Group of Hospitals, Byculla, Mumbai 400008.
Email: kamleshjagiasi@yahoo.com
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Introduction: Idiopathic generalized epilepsies are a group of disorders in which EEG shows generalized, bilateral, synchronous, symmetrical spike wave complex and constitute one third of all epilepsies.[1] Patients with IGE have normal neurological status in interictal period and no abnormality on brain imaging. Inter-ictal EEG shows normal background and generalized discharges such as spikes, polys-pikes, poly-spike/spike and waves.[1] The aetiology of seizures is different in India and other

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developing countries as compared to the developed world. Tuberculoma and neurocysticercosis have relatively high frequency in India.[3]Washimkar *et al*.[4] observed that tuberculoma (65.9%), infections (15%), and neurocysticercosis (3.4%) are the major causes of partial seizures in India. Studies done on patients with localizatingseizures also show similar abnormalities. Murthy *et al*.[5] carried out a study on 591 patients with generalized seizures and observed that 53% of them had an identifiable aetiological factor. IGE can have focal discharges in addition to generalized discharges adding to the confusion. Thus it is important to know about the clinical and EEG features of IGE as treatment and prognosis varies.

MATERIAL AND METHODS

IGEs recognized by the International League Against Epilepsy (ILAE)[6] are:

- Epilepsy with GTCS only
- Childhood absence epilepsy
- Juvenile myoclonic epilepsy
- Epilepsy with myoclonic absences
- Juvenile absence epilepsy
- Epilepsy with myoclonic-astatic seizures
- IGE with phantom absences
- Myoclonic epilepsy in infancy
- Perioral myoclonia with absences

This was a cross-sectional study in the patients with Idiopathic Generalized epilepsy at the Department of Neurology at tertiary health care center during one year period i.e. January 2016 to January 2017. All the demographic data like age , sex , Syndromic type of the epilepsy like GTCS, Absences alone, GTCS + absences, GTCS + myoclonic jerks, Myoclonic jerks, Absences and myoclonus, GTCS + absences + myoclonic jerks, Atonic drop, Atonic drop and myoclonic jerks, Atonic drop and absence etc. was identified and noted. The EEG pattern was also noted. The data was presented in the tabular form and expressed in percentages. Interictal EEG was done on Galileo Machine using standard 10-20 system of electrode placement Sleep and Awake EEG were done for at least 30 minutes. Those with normal EEG on first time; underwent repeat sleep and awake EEG for 60 minutes.

RESULT

Table 1: Distribution of the patients as per the age

Age	No.	Percentage (%)
6-15	12	18.46
16-30	29	44.62
31-45	15	23.07
46-60	9	13.84
Total	**65**	**100.00**

The majority of the patients were in the age group of 16-30 years (44.62%), followed by 31-45years (23.07%); 6-15 years (18.46%); 46-60 years (13.84%);

Table 2: Distribution of the patients as per age at onset of seizures

Age at onset	Epileptic syndrome	Frequency
6-15years	Childhood absence epilepsy, Jeavons syndrome, Doose syndrome	18.46%
16-30 years	Juvenile absence epilepsy, Juvenile myoclonic epilepsy, Jaevons syndrome, IGE with GTCs only	44.62%
>30 years	Juvenile myoclonic epilepsy, IGE with phantom absences and IGE with GTCs only	36.91%

Table 3: Distribution of the patients as per the sex

Sex	No.	Percentage (%)
Male	25	38.46
Female	40	61.54
Total	**65**	**100.00**

The majority of the patients were Female i.e. 61.54% followed by Male 38.46 %.

Table 4: Distribution of the patients as per the various EEG pattern

	No.	Percentage (%)
Normal EEG	12	18.46
Abnormal	53	81.54
Focal discharges	21	32.30
Unilateral focal discharges	15	71.42
Bilateral focal discharges	6	28.57
ORIDA	10	15.4
Polspike spike wave pattern	14	21.53
Generalized spike/sharp wave discharges	26	40
Generalised sharp wave discharges alone	13	20

EEG pattern was normalin 18.46% and Abnormal in 81.54%. Focal discharges were seen in 32.30% of patients, predominantly from fronto-central region. The focal discharges were unilateral in 71.42% cases and were synchronous bilateral in the remaining 28.57%. Occipital rhythmic intermittent delta activity (ORIDA) was seen in 15.4% patients. Poly-spike, spike wave discharges were seen exclusively with JME.

Various types of seizure patterns were GTCS in 23.08% followed by Absences alone in 20.00%, GTCS + absences in 13.85%, GTCS + myoclonic jerks in 12.31%,Myoclonic jerks in 7.69%, Absences and myoclonus in 6.15%, GTCS + absences + myoclonic jerks in 6.15%, Atonic drop in 4.62%, Atonic drop and myoclonic jerks in 3.08%, Atonic drop and absence in 3.08%. Frequency of discharges was less than 3 Hz in patients with atonic drop and absence, atypical absence seizures and occasionally with GTCs alone whereas in the remaining frequency of generalized discharges was more than 3 Hz.

Table 5: Distribution of the patients as per the Seizure type

Seizure type	No.	Percentage (%)	Frequency of generalized discharges on EEG
GTCS	15	23.08	2.5-4 Hz
Absences alone	13	20.00	3 Hz
GTCS + myoclonic jerks	9	13.85	3-6 Hz
GTCS + absences	8	12.31	3-4 Hz
Myoclonic jerks	5	7.69	
Absences and myoclonus	4	6.15	3-6 Hz
GTCS + absences + myoclonic jerks	4	6.15	3-6 Hz
Atonic drop	3	4.62	2-3 Hz
Atonic drop and myoclonic jerks	2	3.08	>3Hz
Atonic drop and absence	2	3.08	2-3 Hz
Total	**65**	**100.00**	

Table 6: Duration of discharges and Seizure types

Duration of discharges	Seizure type	Frequency
<2seconds	IGE with GTCs only, Perioral myoclonia with absences	53.08%
2-4 seconds	JME, Jaevons syndrome	18.36%
4-30 seconds	CAE, JME	28.56%

Abortive generalized bursts of discharges (<2 seconds) constituted 53.08% of abnormal generalized EEG pattern whereas in the remaining 46.92%, bursts were more than 2seconds.

Table 7: Activation manouvers and discharges

Activation maneuver and discharges	Was Seen in
Hyperventilation	CAE, JAE, JME, IGE-GTCs only, Jaevons syndrome
Photic stimulation	JME, Jaevons syndrome, IGE-GTCs only, CAE, JAE

Photic stimulation accentuated discharges in all 14 patients with JME whereas hyperventilation induced discharges in 92.30% of childhood absence epilepsy.

DISCUSSION

The idiopathic generalised epilepsies (IGE) are a group of overlapping epilepsy syndromes. IGE is a common form of epilepsy accounting for 15–30% of all epilepsies.[6,7] The diagnosis is based on strict clinical and EEG features as proposed by the International League Against Epilepsy (ILAE).[6] IGE can present at any age, being more common in the first or second decade of life, however recent studies suggest it presents more frequently in adults than previously thought.[8] Patients may present with absence seizures, myoclonic seizures, tonic clonic seizures or atonic seizures either alone or in various combinations.[7] Based on the predominant type of seizure, age of onset of seizures and EEG characteristics, patients may be classified according to the ILAE classification of generalised epilepsies. The main syndromes seen in clinical practice are: childhood absence epilepsy (CAE), juvenile absence epilepsy (JAE), juvenile myoclonic epilepsy (JME) and IGE with generalised tonic clonic seizures alone (EGTCSA).[7,9] Electroencephalographic (EEG) studies in patients with generalised epilepsy show generalised, symmetrical, bilateral and synchronous spike and slow wave discharges or multispike and slow wave discharges which can be provoked or facilitated by hyperventilation or photic stimulation in up to one third of cases. Absence seizures are usually associated with a 3 Hz spike and high amplitude slow wave during the seizure and are provoked by hyperventilation.[10] The absence of EEG changes on a single study however does not rule out generalised epilepsy and repeated studies or sleep deprived studies may be necessary to demonstrate the characteristic abnormalities. Epidemiologic studies of epilepsy in general indicate that there is a slight male predominance.[11,12] Studies of generalised epilepsy however have shown a slight female predominance, particularly in generalised absence epilepsy. More recently, a Danish Study found more women than men were diagnosed with IGE and that this difference was more evident for patients diagnosed with JAE and JME but not IGE with GTC.[12,13] In our study we have found that the majority of the patients were in the age group of 16-30 years (44.62%), followed by 31-45years (23.07%); 6-15 years (18.46%); 46-60 years (13.84%); Females (61.54%) were more affected than males (38.46%). Various types seizure patterns were GTCS alone in 23.08% followed by Absences alone in 20.00%, GTCS + myoclonic jerks in 13.85%, GTCS + absences in 12.31%, Myoclonic jerks in 7.69%, Absences and myoclonus in 6.15%, GTCS + absences + myoclonic jerks in 6.15%, Atonic drop in 4.62%, Atonic drop and myoclonic jerks in 3.08%, Atonic drop and absence in 3.08%. EEG pattern was Abnormal in 81.54% and normal in 18.46% even with repeated EEG studies. Photic stimulation accentuated discharges in all 14 patients with JME whereas hyperventilation induced discharges in 92.30 % of childhood absence epilepsy. Abortive generalized bursts of discharges (<2 seconds) constituted 53.08% of abnormal generalized EEG pattern whereas in the remaining 46.92%, bursts were more than 2seconds. Poly-spike, spike wave discharges were seen exclusively with JME. The term 'generalised' refers to the seizures 'in which the first clinical changes indicate initial involvement of both hemisphere. The ictal encephalographic patterns initially are bilateral'. The statement however is not entirely true. At least 40% of patients with idiopathic generalised epilepsies (IGE)

display non-localising focal discharges in the inter-ictal EEG (with or without generalised discharges).[2,14] Focal discharges were seen in 32.30% of patients, predominantly from fronto-central region. The focal discharges were unilateral in 71.42% cases and were synchronous bilateral in the remaining 28.57%. Occipital rhythmic intermittent delta activity (ORIDA) was seen in 15.4% patients.

CONCLUSIONS

It can be concluded from our study that the majority of the patients were in the age group of 15-30 and majority were females. Most common seizure types were GTC alone followed by absence alone followed by GTC + myoclonic jerks. Focal discharges can be seen with IGE, mostly from the frontocentral region. Also ORIDA can be seen in generalized epilepsy particularly CAE. Polyspike discharges are exclusively seen with JME. Photic stimulation accentuated discharges in all patients with JME whereas hyperventilation accentuated discharges in patients with childhood absence epilepsy. Abortive generalized burst of discharge (<2 seconds) was the most common generalized discharge pattern in EEG.

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