Frequency of EEG Changes In Different Types of Clinically Diagnosed Epileptic Patients

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Abstract:

Background: *Diagnosis of epilepsy is based mainly on clinical history and examination. EEG constitutes the single most valuable laboratory test in the evaluation of patients with epilepsy. Objective: The objective of the present study was to find out the frequency of EEG abnormality among different types of clinically diagnosed epileptic patients. Methods: This cross-sectional study was carried out in the Department of Neurology, Bangabandhu Sheikh Mujib Medical University, Dhaka. A total of 152 epileptic patients attended in the Epilepsy Clinic, General OPD and EEG room of the Department of Neurology were enrolled for this study. Information on socio-demographic and seizure characteristics was obtained. The records from patients were obtained using the standard data collection form. Result: Out of 152 epileptic patients male were 62.5% and female were 37.5%, mean age was 20.69 ± 11.83 years. Abnormal EEG was found in 81 (53.3%) patients. Most of the patients 64 (79.0%) had generalized epileptic discharge and 17 (21.0%) had focal epileptic discharge. Out of 81 patients with abnormal EEG wave, 31 (38.3%) patients had spike and wave, 26 (32.1%) patients had sharp wave and 24 (29.6%) patients had multiple types of EEG wave. Conclusion: The EEG is an important tool for diagnosing an epilepsy syndrome, knowledge of which aids in planning treatment and determining prognosis.*

Introduction:

Epilepsy is a common chronic neurological disorder. More than half a century before the discovery of the human EEG, Hughlings Jackson offered a definition of epilepsy based on patho-physiology[1]. Though Gibbs and his colleagues[2] discovered the pattern of epileptic discharges in 1935, the first description of an Epileptic crisis dates back to 3000 BC. Since the introduction, Electroencephalogram (EEG) has been used to diagnose and manage epilepsy. A seizure is any clinical event caused by abnormal electrical discharge in the brain whilst epilepsy is tendency to have recurrent seizures.[3]. In other words the term "Epilepsy" refers to recurrent and unprovoked seizures. About 50 million people worldwide have epilepsy, with almost 90% of these people being in developing countries[4]. There is a wide variation of incidence of epilepsy worldwide due to variation in classification system of epilepsy and methodology adopted in different studies[5]. The life time incidence of epilepsy varies from 2% to 5%. With the incidence of 2-10 per thousand for South East Asian countries, it is estimated that there are 1.5-2 million people suffering from epilepsy in Bangladesh. Epilepsy is more likely to occur in young children or people over the age of 65 years, however it can occur at any time[7]. Broadly, epilepsies are classified as either generalized or partial with several subcategories in each class[8]. Most primary epilepsies are thought to have a genetic basis and their mode of inheritance is polygenic[9]. Its etiology and pathogenesis depends on multiple factors i.e. idiopathic, genetics, environmental, metabolic and various structural lesions in the brain. Epilepsy is mostly diagnosed

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clinically, but EEG remains central to the diagnosis of epilepsy[10]. Even with the tremendous advances in Neurodiagnostic procedure, the role of EEG is not abolished[9].

Methods:

This cross-sectional descriptive study was carried out in Epilepsy Clinic, General OPD and EEG room in the Department of Neurology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka over a period of two and half years from January 2014 to June 2016. A total of 152 clinically diagnosed epileptic patients attended in Epilepsy Clinic, General OPD and EEG were enrolled in this study. Epileptic patients having metabolic disturbances were excluded. In all cases single EEG was done following standard procedure by expert EEG technician using 10/20 channel EEG machine with photic stimulation, sleep deprivation and hyperventilation and EEG was done for at least 20-30 minutes. The demographic information, relevant history, examination findings and investigation reports of all the study subjects were recorded in the data collection sheet. Result was done by using Microsoft Excel.

Results and Observation:

In this study, mean age of the patients was 20.69±11.83 years within the range of 1.5-75 years. Male (62.5%) were predominant than female (37.5%). Male female ratio was 1.67:1. In this study, 102 (67.1%) cases were generalized seizure and 50 (32.9%) cases were focal seizure. Among generalized seizure patients most common clinical features were generalized convulsion 63.2%, frothy mouth 61.8%, loss of consciousness 59.9% and tongue bite 57.2 % in case of generalized seizure and in focal seizure most common was abnormal movement (20.4%). According to clinical diagnosis, most of the patients (50.7%) had GTCS followed by 19 (12.5%), 18 (11.8%), 13 (8.6%), 13 (8.6%) and 12 (7.9%) patients had focal seizure without impairment of consciousness, focal seizure with secondary generalization, absence seizure, focal seizure with impairment of consciousness and myoclonic seizure respectively. Abnormal EEG was found in 81 (53.3%) patients, of them most of the patients (65.3%) had generalized epileptic

discharge and 25 (34.7%) had focal epileptic discharge. Among focal epileptic discharge, 9 (52.9%) patients had temporal focal seizure followed by 5 (29.4%) and 3 (17.7%) patients had frontal focal seizure and parietal focal seizure respectively. Among generalized seizures, 56 (87.5%) patients had generalized epileptic discharge and 8 (12.5%) patients had typical absence seizure. Out of 81 patients with abnormal EEG wave, 31 (38.3%) patients had spike and wave, 26 (32.1%) patients had sharp wave and 24 (29.6%) patients had multiple types of EEG wave.

Table-I
Distribution of patients according to age (n=152)

	Frequency	Percentage
Age		
Mean ± SD	20.69 ± 11.83	
Range (min-max)	1.5 -75	
Gender		
Male	95	62.5
Female	57	37.5

Table-II
Distribution of patients according to common presenting features (n=152)

Presenting features	Frequency	Percentage
Generalized seizure	102	67.1
Generalized convulsion	96	63.2
Frothy mouth	94	61.8
Loss of consciousness	91	59.9
Tongue bite	87	57.2
Post ictal confusion/ Headache	77	50.7
Urinary incontinence	60	39.5
Nocturnal attack	34	22.4
Focal seizure	50	32.9
Abnormal movement	31	20.4
Impairment of consciousness and abnormal mannerism	21	13.8
Convulsion starts on one side then generalized	11	7.2
Psychiatric symptoms	8	5.3

Table-III

Distribution of patients according to clinical diagnosis (n=152)

Clinical	Frequency	Percentage
GTCS	77	50.7
Focal seizure without impairment of consciousness	19	12.5
Focal seizure with secondary generalization	18	11.8
Typical absence seizure	13	8.6
Focal seizure with impairment of consciousness	13	8.6
Myoclonic seizure	12	7.9

Table-IV

Distribution of patients according to clinical diagnosis and their EEG findings (n=152)

Clinical diagnosis	Total (n=152)	EEG	
		Normal(n=71)	Abnormal(n=81)
GTCS	77	44.2% (34/77)	55.8% (43/77)
Focal seizure without impairment of consciousness	19	42.1% (8/19)	57.9% (11/19)
Focal seizure with secondary generalization	18	55.6% (10/18)	44.4% (8/18)
Typical absence seizure	13	38.5% (5/13)	61.5% (8/13)
Focal seizure with impairment of consciousness	13	53.8% (7/13)	46.2% (6/13)
Myoclonic seizure	12	58.3% (7/12)	41.7% (5/12)
Total	152	46.7% (71/152)	53.3 (81/152)

Table V

Distribution of abnormal EEG findings in patients according to seizure type (n=81)

Abnormal	Frequency	Percentage
Focal epileptic discharge	17	21.0
Temporal	9	52.9
Frontal	5	29.4
Parietal	3	17.7
Generalized epileptic discharge	64	79.0
Generalized epileptic discharge	56	87.5
Typical absence seizure	8	12.5

Table-VI

Distribution of abnormal EEG wave (n=81)

Abnormal activity	Frequency	Percentage
Spike and wave	31	38.3
• Generalized epileptic discharge	14	17.3
• Focal epileptic discharge	9	11.1
• Typical absence seizure	8	9.9
Sharp and wave	26	32.1
• Generalized epileptic discharge	23	28.4
• Focal epileptic discharge	3	3.7
Multiple	24	29.6
• Generalized epileptic discharge	19	23.5
• Focal epileptic discharge	5	6.2

Discussion:

Diagnosis of epilepsy is based mainly on clinical history and examination. EEG constitutes the single most valuable laboratory test in the evaluation of patients with epilepsy. It is a safe, non-invasive procedure for evaluation of electrophysiological state of patients with epilepsy in the ictal or interictal period.

Marino et al[6] showed that the incidence of epilepsy is highest at both extreme of ages, especially in neonatal period and after 6th decade. It varies among different age groups and forms a U-shape curve, which shows the lowest incidence for people between the age of 30 and 40 years. The highest incidence of epilepsy is seen in the first year of life as well as among the elderly[11]. In this study 84.2% patients were below or equal to 30 years of age. Chowdhury et al[11] found 85.8% patients below 31 years and Owolabi et al[12] found 74.5% of epilepsy were <31 years old. Most of the patients in this study were children and young adult.

This study showed that males (62.5%) were more prone to epilepsy than females (37.5%), this may be due to some of the risk factors, like trauma, are more common among males. In the study of Owolabi et al.[12], male was 61.2% and female was 38.8%. Similar result was seen in the study of Sidig et al.[13] [Male was 54.1% and female was 45.9%].

In this study, out of 152 patients most common clinical features were generalized convulsion 63.2%, frothy mouth 61.8%, loss of consciousness 59.9% and tongue bite 57.2% in case of generalized seizure and in focal seizure most common was abnormal movement (20.4%). Almost similar result was found in the study of Sidig et al[13].

In our study, among the clinically diagnosed epileptic patients most of them (50.7%) had GTCS followed by 19 (12.5%), 18 (11.8%), 13 (8.6%), 13 (8.6%) and 12 (7.9%) patients had focal seizure without impairment of consciousness, focal seizure with secondary generalization, absence seizure, focal seizure with impairment of consciousness and myoclonic seizure respectively in clinical diagnosis. Sidig et al.[13] found that 86.4% had generalized epilepsy, while 13.6% had focal epilepsy clinically.

Most of our epileptic patients had generalized epilepsy, may be due to the fact that generalized epilepsy is dramatic in its presentation. So that affected people are interested to seek medical treatment, unlike focal seizures which may go unnoticed.

In this study abnormal EEG was found in 53.3% patients. Abnormal EEG was seen in 57.1%, 62.7% and 65.0% epileptic patients in the study of Owolabi et al.[12], Chowdhury et al.[12] and Sidig et al.[13] respectively.

Most of the patients (79.0%) had generalized epileptic discharge and 17 (21.0%) had focal epileptic discharge in abnormal EEG. Sidig et al.[13] reveled abnormal EEG in 64.8% cases, of them 86.4% had generalized discharges while 13.6% had focal discharge. Owolabi et al.[12] found 51.5% generalized and 48.5% partial among abnormal EEG patients.

Among patients with focal seizure 9 (52.9%) patients had temporal focal seizure followed by 5 (29.4%) and 3 (17.7%) patients had frontal focal seizure and parietal focal seizure respectively. Among the patients with Focal seizure, most common focus was temporal lobe. Temporal lobe was the most vulnerable part in focal seizure[14].

Out of 81 patients with abnormal EEG wave, 31(38.3%) patients had spike and wave, 26 (32.1%) patients had sharp and wave and 24 (29.6%) patients had multiple types of EEG wave. Among patients with epileptiform activity, generalized sharp and wave complexes and focal sharp and slow wave complexes were the most common finding[13]. In contrast to our findings Chowdhury et al.[11] found 74% spike and wave, 11% sharp and wave 6% poly spikes and 2% slow waves, which probably accounts for the difference in age group of sample population.

Conclusion:

Based on the above study it can be concluded that diagnosis of epilepsy is based on clinical history and examination. EEG may constitute as one of the most valuable laboratory test in the evaluation of patients with epilepsy. The presence of an interictal spike/sharp wave helps to confirm a clinical diagnosis of epilepsy, aids in defining the

epilepsy syndrome, provides information that assists in planning drug management and determining prognosis.

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