

Clinical Finding of Electroencephalographic (EEG) Data in Adults: A Retrospective study

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Abstract

Background: Electroencephalography (EEG) is the first and only real-time monitor of epileptic seizures, and is a powerful measure of cerebral function in the seriously ill. **Objective:** The purpose of this study was to see the common conditions for doing EEG. **Methods:** This study was performed retrospectively by collecting and reviewing the electro-clinical information of the adult patients to whom EEGs were done at the 'Central Hospital' laboratory. Clinical problems were categorized into seizures, fainting attacks, headache, giddiness, vertigo, stroke, suicidal tendency, sudden aggressiveness and head injury. Routine EEGs were performed for 30 minutes. EEG findings were categorized as normal for the age, localized or generalized epileptiform discharges, non-epileptogenic dysfunction. **Result:** In total 53 adult patients 34% population had fainting attacks, 28% had seizures, 10% had stroke and 28% had complaint related to behavior, suicidal tendency, headache and post head injury problems. EEG was normal in 60%. **Conclusion:** EEG is advised for diverse conditions. The proportion of epileptic patients is small, although this is the principal indication for doing routine EEG. [J Shaheed Suhrawardy Med Coll, 2014;6(1):14-17]

Keywords: EEG, epilepsy, seizure

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Introduction

Brain cells produce tiny electrical signals known as impulses. EEG helps to measure this electrical activity of the brain¹. EEG gives functional information of the brain; on the other hand CT scan and MRI give structural information². Although before the advent of Neuro-imaging techniques EEG was done to diagnose various brain abnormalities³.

Currently EEG is primarily indicated for the diagnosis and evaluation of the different conditions like epilepsy or any seizure disorder, syncope, non-epileptic attack disorder,

infections like Herpes Simplex encephalitis or slow virus diseases and drop attacks. EEG is also performed to evaluate the problems with sleep, to investigate periods of unconsciousness, to monitor the brain during brain surgery and to declare brain death in complicated cases⁴. EEG has relatively low sensitivity in epilepsy, ranging between 25-56%. Specificity is better; however, it has been varied from 78 to 98%⁵. Misinterpretation of non-epileptogenic phenomena or over interpretation of non-specific EEG abnormalities and spiky paroxysmal variants of normal cerebral rhythms are a common reason for over-diagnosis of epilepsy⁷. Standard

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activation procedures of hyperventilation up to three minutes and photic stimulation should be included in routine EEG recordings⁸. It is critical to recognize that EEG should be obtained under optimal conditions and the interpretation should be performed by an Epileptologist⁹. There is some limited data to indicate that EEG can be harmful and lead to over diagnosis and unnecessary treatment when used for diagnostic confirmation by less experienced readers. There is a general agreement among epileptologists that over reading is more harmful than under reading and that less experienced readers are more likely to over interpret benign patterns and variants as epileptic. The purpose of this present study was to see the common conditions EEG.

Methodology

This was a retrospective study carried out in Electrophysiology Laboratory of 'Central Hospital, Dhaka' from July 2011 to June 2012 for a period of one (01) year. Permission was taken from the 'Central Hospital' Authority to use and to analyze the data of their electrophysiology laboratory. The electro-clinical information of the adult patients was collected as well to whom EEG was performed at this laboratory. Presenting problems were categorized, like seizures, fainting attacks, headache, giddiness, vertigo, stroke, suicidal tendency, sudden aggressiveness and head injury. Each recording of EEG was obtained through digital equipments by the EEG machine (Nicolet, USA) with minimal duration of 30 minutes and electrodes were positioned on scalp according to international 10-20 system¹¹. The patients with marked artifacts on EEG were excluded from this study. For standardization, the background activity was classified as normal which were organized and also symmetrical or abnormal which were disorganized with or without asymmetry. The EEG was examined for specific epileptiform abnormality, the interictal spike or sharp wave. The abnormal activity was also classified as generalized or focal. The presence and topography of bursts of slow waves and epileptiform paroxysms were evaluated. Again, the epileptiform paroxysms were classified as spike-wave, sharp-wave and poly spike. EEG findings were categorized as normal for the age, localized or generalized epileptiform discharges and non-epileptogenic dysfunction. Statistical analysis was performed by using window based computer software program with Statistical Packages for Social Sciences (SPSS-V.17) (SPSS Inc, Chicago, IL, USA). All data were recorded systematically in preformed data collection form (questionnaire) and quantitative data were expressed as mean and standard deviation and qualitative data were expressed as frequency distribution and percentage. Chi-square test was performed to see the association between qualitative variables.

Results

A total number of 1466 patients were included in this study of which 53(4.0%) patients were recruited as study population. Male was 21(40%) and female was 32 (60%) cases (figure).

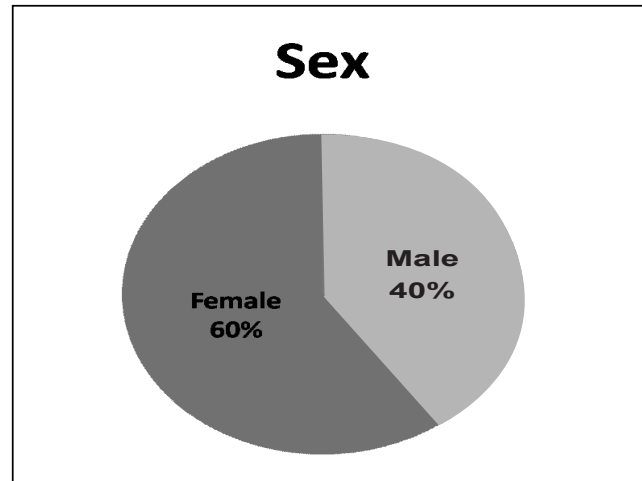


Fig:1- Sex distribution of the study population (n=53)

Among the patients 26(48%) were young (>18 to 30 year), 19(36%) were in the middle age (>30-50 year), 4(8%) belong to 50-70 year age group and 4(8%) over 70 year age (Table 1).

Table 1: Age distribution of the study population

Age group	Number of patients	Percentage
>18-30 year	26	48%
>30-50 year	19	36%
>50-70 year	04	08%
>70 year	04	08%

The presenting complaints were fainting attacks 18(34%) patients, seizure 15(28%) patients, headache 8(15%) patients, behavioral disturbance 7(13%) patients and stroke 5(10%) patients (Table 2).

Table 2: Causes for EEG referral

Causes for EEG referral	Number of patients	Percentage
Seizure	15	28%
Fainting attacks	18	34%
Headache	08	15%
Behavioral disturbance	07	13%
Stroke	05	10%

EEG was normal in 32(61%) patients; epileptiform discharge was found in 16(30%) and nonspecific EEG dysfunction was noted in 5(9%) patients. Among the patients presenting with history of seizure EEG was found normal in 9(60%) patients and 6(40%) patients showed epileptiform abnormality. Among those patients who had complaints other than seizure, 33(87%) had normal EEG and 5(13%) showed nonspecific dysfunction.

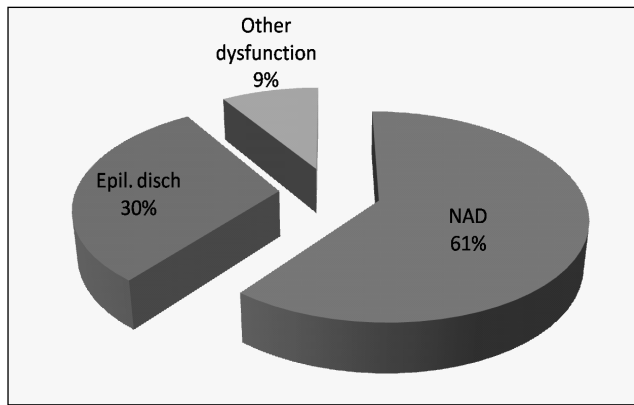


Fig-2: EEG findings of the total population (Epil. Disch= Epileptiform discharge, NAD=No abnormality detected)

Discussion

Although the number of study population is small it reflects that reasons for doing an EEG in the adult population are diverse. Only one quarter of the population are referred for the evaluation of seizure disorder which is actually the principal indication. Several published studies on adult epilepsies showed that the chance of detecting interictal epileptiform discharges (IEDs) from the first EEG varies between 29% and 55% at outdoor monitoring of patients¹²⁻¹⁴. The present study data also reveals the same scenario. However, in some studies it is evident that EEG may be positive up to 70% case¹⁵.

Table 3: EEG Findings of the total population

EEG report	Frequency	Percentage
Normal	32	61%
Epileptiform discharge	16	30%
Other non-specific dysfunction	05	09%
Total	53	100%

Besides any brain pathology like traumatic brain injury, stroke would show some abnormality in EEG. These findings have no practical application unless associated with clinical problems. In this era of neuro-imaging facilities, unnecessary requisition for EEG increases load on the laboratory and provides no extra beneficial information. Major portion of the study population is female who are referred for psychogenic complaints where EEG has no significant role. So selection of the patients for whom EEG is recommended should be based on sound knowledge about seizure and power of EEG to identify various cerebral pathology. More studies are required in other centers to justify the situation.

In specialized units, video-EEG or ambulatory long term EEG monitoring to obtain an ictal recording are very helpful, but these techniques are not available in most cases¹⁶. It is therefore not surprising that epilepsy frequently is misdiagnosed in children and even in adult. Many paroxysmal events may be mistaken for epilepsy like tics, staring, syncope, dystonia, psychogenic seizures, and behavioural disturbances during sleep¹⁷.

Table 4: EEG Finding according to clinical problem

EEG Finding	Clinical Problems		Total
	Seizure patients	Non-seizure patients	
Normal	9 (60.0%)	33 (87.0%)	42(79.2%)
Abnormal	6 (40.0%)	5 (13.0%)	11(20.8%)
Total	15(100.0%)	38(100.0%)	53(100.0%)

*Chi-square test has been performed (3.221); p-value: 0.073

Conclusion

In conclusion, it is very clear that in majority cases EEG is performed to diagnose epilepsy. In addition to that EEG is done among the younger age group of female patient. Furthermore, seizures & fainting attacks are the most common symptoms where EEG is investigated.

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