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SEIZURES;
A CLINICAL, ELECTROENCEPHALOGRAM (EEG) AND COMPUTED TOMOGRAPHY (CT) SCAN STUDY

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ABSTRACT… Objective: To evaluate the clinical, electroencephalogram (EEG) and computed tomography (CT) scan study of seizures. **Study Design:** Cross sectional study. **Period:** Six months study. **Setting:** Liaquat University Hospital Hyderabad. **Patients and methods:** All patients of more than 18 years of age, either gender had seizures for the first time were recruited and included in the study. The data was analyzed in SPSS 16 and the frequency and percentage was calculated. **Results:** During six months study period total 50 patients were evaluated for seizures, of which 35 (70%) male and 15(30%) were females, majority of the patients 30(60%) were belonged to urban population while the means age ±SD for overall population was 38.97±7.87 whereas it was 37.76±5.65 and 40.23±6.83 in male and female population respectively. Twenty subjects (40%) had partial seizures while 30 (60%) had general seizures while the EEG and CT scan abnormalities was observed in 35 (70%) and 32 (64%) patients respectively. Regarding etiology the 20(40%) subjects were idiopathic, tuberculoma was observed in 9(18%) patients and cerebral infarct / hemorrhage in 8(16%) subjects respectively. **Conclusion:** It is concluded that abnormal EEG supportive to confirm the diagnosis of seizures. CT scan was abnormal in 64% of patients revealing structural abnormalities. Majority of cases were idiopathic although tuberculosis, cerebral infarct / hemorrhage and brain tumors were predominant etiological factors.

Key words: Seizure, epilepsy, electroencephalogram, computed tomography, cerebrovascular accident and brain tumors

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INTRODUCTION

Patients with seizure or epilepsy has major place in neuro-medical practice, the seizures may be the symptom of underlying disorder, a detailed history and thorough work up is usually required for the evaluation of such individuals and for treatment.[1] Epilepsy is a group of disorder and not a single homogeneous disease and seizure may be a symptom of both diverse brain diseases and an otherwise normal nervous system and is neither possible nor desirable to create guidelines for what constitutes a standard or minimal set of diagnostic investigations.[2]

In the past huge number of cases was labeled as epilepsy of unknown origin and the introduction of EEG and CT scan have really support to assess the etiology of epilepsy.[3] The evaluation of seizures includes a detailed history, specific clinical examination, electroencephalography (EEG), advanced neuroimaging and functional neuroimaging.[4] Different health care providers use certain combinations of such methodologies considering their cost and yield of information.[5]Localization of abnormalities in partial seizures are from 28% to 80% as observed by various studies.[6, 7] although studies conducted on patients with generalized seizures also show such abnormalities.3 Dam AM, et al[8] studied 221 subjects who had first seizure after 25 years of age. All patients were clinical evaluated and had electroencephalography (EEG) and computed tomography (CT). The major etiological group was idiopathic (38%).[8] Alcoholism as the etiology factor in subjects had long standing alcohol use, concomitant signs of alcohol intoxication and spontaneous recurrent epileptic fits made up a group of one fourth (25%) of subjects with late

onset epilepsy while the brain mass was the cause in 16%, cerebrovascular infarction and hemorrhage in 14%.[8]

In view of the above facts we conducted this study at tertiary care teaching hospital in context to evaluate various etiological factors responsible for seizures and also to assess the role of EEG and CT scan as a diagnostic aid in various seizure disorders because early identification and treatment can save the patients from life threatening seizures.

PATIENTS AND METHODS

This cross sectional study of six months was conducted in the department of medicine Liaquat University Hospital Hyderabad / Jamshoro. All patients of more than 18 years of age, either gender had seizures for the first time were recruited and included in the study while the patients who had some known etiological factors, already on anti-seizure medication or non cooperative subjects who refused to participate in the study, patients with seizures following trauma to central nervous system, CNS infections like meningitis, encephalitis, metabolic disorders like hypoglycemia and alcohol related seizures were placed in exclusion criteria. The detailed history was taken and relevant clinical examination was performed, baseline and specific investigations were done and were managed accordingly. The informed consent was taken from every patient or next to kin and the data was collected on the predesigned proforma. The electroencephalography (EEG) was done in all patients using 32 channel digital EEG machine of Nihon Kohden, the resting awake with hyperventilation and photic stimulation records were recorded. EEG was reported as Normal or abnormal (focal, diffuse, epileptiform discharges includes generalized and focal) while the patients were also had single slice spiral CT and plain and contrast slice (if required). The CT was reported as normal, abnormal which includes site or nature of lesion and diagnosis. All the clinical maneuvers were performed by the collaboration of whole research team while the data was saved and analyzed in SPSS 16. The frequency and percentage (%) was calculated while the mean ± SD was computed for numerical variables. The stratification was done for categorical variables and the chi-square test was applied at 95% confidence interval and the level of significance was p-value ≤0.05.

RESULTS

During six months study period total 50 patients were evaluated for seizures, of which 35 (70%) male and 15(30%) were females, majority of the patients 30(60%) were belonged to urban population while the means age ±SD for overall population was 38.97±7.87 whereas it was 37.76±5.65 and 40.23±6.83 in male and female population respectively. Regarding clinical findings, History of loud moan or ictal cry was present in one patient in 2(4%), urinary incontinence during the episode of seizure was present in 10(20%), tongue bite was present in seven patients (14%) and six patient (12%) had gum lacerations, altered sensorium was present in seven patients (14%), three patients (6%) presented with status epilepticus and focal neuro-deficits were present in five patients (10%) respectively. the clinical, EEG and CT scan characteristics of study population, CT and EEG correlation and etiology of the seizures are mentioned in Table 01-03.

DISCUSSION

The present study showed that the unprovoked seizures are more common in males (80%) as compared with females (20%). This is consistent with international studies all of which report a male preponderance.[9]

In the present study 70% of patients had generalized seizures whereas 30% of patients had partial seizures while the average age was also consistent with the study by Nordli DR, et al.[10]Ghazy A. et al, studied 89 patients with epileptic seizure disorder and found EEG to be abnormal in 89% of patients. [11]Newfeld MY, et al evaluates ninety one patients with generalized seizure and the EEG was taken within, the abnormal EEGs were observed in 69% of subjects.

Number of seizures (at the time of presentation)	Number of cases (n)	Percentage (%)
One	12	24
Two	15	30
More than two	23	46
Total	50	100
Seizure Type		
Partial		
Simple	10	20
Complex	05	10
Partial with secondary generalized	05	10
Generalized		
Tonic clonic (grandmal)	22	44
Absence (Petit mal)	00	00
Tonic	03	06
Atonic	02	04
Myoclonic	03	06
Total	50	100
EEG		
Normal	15	30
Epileptiform discharges		
Generalized	20	40
Focal	08	16
Focal slowing	05	10
Diffuse slowing	02	04
Total	50	100
CT SCAN		
Normal	18	36
-Single, ring or disc enhancing lesion (≤ 2 cms)	10	20
- Multiple or large (> 2 cms) ring enhancing lesions	06	12
- Cerebral infarct / hemorrhage	06	12
- Brain tumor / mass	05	10
- Cortical venous thrombosis	02	04
- Diffuse cerebral atrophy	02	04
- Calcification	01	02
Total	50	100

Table-I. Clinical, EEG and CT scan characteristics of study population

		CT SCAN		Total
		Normal	Abnormal	
EEG	Normal	5	10	15
		27.8%	31.2%	30.0%
	Abnormal	13	22	35
		72.2%	68.8%	70.0%
Total		18	32	50
		100.0%	100.0%	100.0%

Table-II. CT Scan and EEG correlation in seizure

Parameter	Number of cases (*n*=50)	Percentage (%)
Idiopathic (no cause identified)	20	40
Neurocysticercosis	02	04
Tuberculoma	09	18
Cerebral infarct / hemorrhage	08	16
Brain tumor / mass	07	14
Cortical venous thrombosis	02	04
Diffuse cerebral atrophy	02	04

Table-III. The etiology identified in relation to seizure

Epilptiform activity was identified in twenty one percent of patients, (9% generalized, 10% focal and 2% generalized and focal), slowing in 58% (21% focal, 7% focal and generalized and 31% generalized) and both epileptiform activity and slowing in ten percent (10%).[12] Forsgren L, et al studied 103 adult persons and epileptiform activity was observed in 18% of patients and was more identified in partial than generalized seizures while in the present study EEG was abnormal in 35(70%) of patients.[13] Thus EEG supports us to confirm the diagnosis of seizures and in case of structural lesions though not sensitive enough focal abnormalities gave a clue to the underlying focal structural abnormalities. Scollo-Lavizzari G, et al had observed that CT was abnormal in 62.5% of patients with partial seizures and 34% of patients with generalized seizures.[14]Reinikainen KJ, et al studied incidence and CT abnormalities and their correlates with clinical and EEG presentations were evaluated in a consecutive series of 202 subjects with epileptic seizures, the abnormal CT remarks were observed in 36% of the patients. The abnormalities detected were brain tumors (17%), atrophic lesions (11%), and other finding (8%) such as arteriovenous malformations. delaSayette V et al 31 revealed cerebral atrophy in 113 cases, ischemic / hemorrhagic lesions in 75, cerebral tumors in 20 and no abnormality in 177 subjects.[15] Bajaj S, et al[16] observed the commonest abnormality was a focal ring or disc enhancing lesion in 66 patients (62.3%) followed by calcification in 18 (16.9%) cerebral atrophy 9 (8.5%) vascular lesions 7 (6.6%) tumors 4 (3.8%) and congenital hydrocephalus 2 (1.5%) whereas the etiology identified in study subjects are presented in Table 03. Rogel-Ortiz FJ, et al[17] identified that the most frequent causes of new onset seizures were neurocysticercosis in 28% followed by cerebral infarct (11%) and brain atrophy (11%).

Overall in our study CT scan was found to be abnormal in 32(64%) of patients and compared to the former studies the percentage of CT scan abnormalities were higher in current study. Single, small ring enhancing lesion was the most common abnormality in our study and is correlated with former literature.[18-20]In our study patients with seizures following trauma to central nervous system, CNS infections like meningitis, encephalitis, metabolic disorders like hypoglycemia and alcohol related seizures were not included.

The present study had observed etiology of seizures in 30 of patients while the studies by Perez Lopez JL, et al[21] and Schoenenberger RA, et al[22] had identified high percentage of seizures where cause was detected. Former literature had observed that neurocysticercosis was the main cause and accounts for 50%, 28% and 37% cases of seizures respectively,[23,24] whereas in our study neurocysticercosis accounts for 4% of seizures. Tuberculoma accounts for 18% of cases of seizures that is consistent to the study by Murthy JMK,et al.[20] Cerebrovascular diseases and cerebral neoplasms accounted for 2-20% and 13-18% of seizures in former studies,[25,26] while in present study it is 16% and 14% cases of seizures. In overall group of seizures when the CT scan was normal EEG was abnormal is recorded in 18(36%) of cases, and when CT scan was abnormal EEG was normal in 15 (30%) of cases. Both were abnormal in 22(68.8%) of subjects. Both were normal in five patients and this is consistent

to the study by Singh G, et al and Robinson P, et al that concluded that the EEG abnormality independent for the number of lesions, but not for site, host response and viability of cysts.[27,28] Alcoholic patients, post traumatic, toxic metabolic causes did not occupy any causes of seizures as these patients were excluded from present study.

CONCLUSION

It is concluded that abnormal EEG support to confirm the diagnosis of seizures and when it display focal abnormalities gives a clue to the underlying structural abnormality. Overall CT scan was abnormal in 64% of patients; CT scan revealing structural abnormalities and helpful in diagnosis and etiology of seizure. Majority of cases (40%) of seizures were idiopathic although tuberculosis, cerebral infarct / hemorrhage and brain tumors were predominant etiological factors.

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PREVIOUS RELATED STUDY

Rushda Aftab. NEONATAL SEIZURES; ETIOLOGY, CLINICAL TYPES AND OUTCOME 199-203 Apr, May, Jun, 2007.

AUTHORSHIP AND CONTRIBUTION DECLARATION

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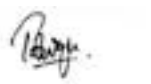
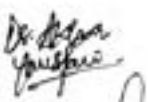
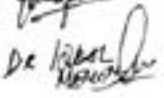
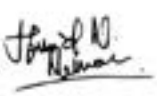
1	Dr. Tariq Zaffar Shaikh	Contribution to conception and design, acquisition of data, analysis and interpretation of data	
2	Dr. Akbar Yousfani	Drafting the article and shares its expert research opinion and experience in finalizing the manuscript	
3	Dr. Iqbal Ahmed Memon	Contributed in conception and interpretation of data and give his expert view for manuscript designing	
4	Dr. Hamid Nawaz Ali Memon	Analysis and interpretation of data contributed in conception and shares its expert research opinion	
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