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Study of Epilepsy and its Correlation with Neuroimaging and Drug Therapy

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Abstract

Background: Thousands of people in the world suffer from epilepsy. Inspite of modern advances, it can be controlled in only 80% of treated once. Diagnosis and treatment of epilepsy is still challenged. The present study is attempted to highlight the importance of clinical findings and role of EEG and CT scan and MRI in diagnosis of epilepsy2. **Aim:** To study the incidence and epidemiological profile, various types of epilepsy and correlation with MRI, CT SCAN, EEG and the effectiveness of various Anti epilepticdrugs in different types of epilepsy. Settings and Design: This is a prospective study carried out at Civil Hospital, Ahmedabad. **Methods:** All the patients having 2 and/or more unprovoked seizures and already enrolled patients in epilepsy clinic in 1 year duration from January 1,2020 to December 31,2020 were included. **Results & Conclusions:** Out of 6930 total admissions, 163 patients with epilepsy were enrolled in this study from age group of 1 month to 12 years. Out of 163 patients, 97 were male and 66 were female. Most common age group affected is of 1-5 years. 128 patients (78.62%) were of generalized epilepsy and 35 patients were of partial epilepsy. Most common precipitating factor in epilepsy is inadequate drug dosages (45%). 45 patients (22.7%) have developmental delay. Abnormal EEG findings were present in 123 patients (75.46%). Abnormal MRI findings were present in 37 patients (22.7%). CT scan was done in 56 patients, 20 were abnormal. 107 patients were on monotherapy and 56 patients were on polytherapy. Valproate is most commonly used drug (76.6%).

Keywords:- Epilepsy, Neuroimaging, Monotherapy.

INTRODUCTION

The word "epilepsy" is derived from the Greek "epilepsia" which means "to take hold of" or "to seize."It is a disorder of brain characterized by enduring predisposition to generate seizures and by neurobiologic, cognitive, psychologic and social consequences of this condition.[1]

Seizure is a transient occurrence of signs and/or symptoms resulting from abnormal excessive or synchronous neuronal activity in the brain. Epilepsyis a disorder that manifest 1 or more specific seizure types and has specific onset and a specific prognosis.[2,3,4]

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During the first half of this century the main drugs for the treatment of epilepsy were phenobarbitone (1912) and phenytoin (1938). Since the 1960s there has been an accelerating process of drug discovery, based in part on a much greater understanding of the electrochemical activities of the brain, especially the excitatory and inhibitory neurotransmitters.[5,6,7]

New Classification Of Seizure Type Basic Version (International League Against Epilepsy 2017):[8]

FOCAL ONSET (Aware/ Impared awareness)
- MOTOR
- NON MOTOR: Focal To BilateralTonic Clonic

GENERALIZED ONSET (Impaired awareness)
- MOTOR : Tonic clonic other motor
- NON MOTOR: Absence

UNKNOWN ONSET
- MOTOR: Tonic clonic other motor
- NON MOTOR

Antiepileptic drugs do not alter the natural history or prognosis of epilepsy. They have no effect on epileptogenesis, they affect only the recurrence rate. Before starting AEDs, the seizure type, probable etiology should be defined after diagnostic workup.[8,9]

Intractable epilepsy in children[10]: 10-20% of epileptics have intractable epilepsy by defmation 29, when the child has had uncontrolled seizure minimum one per month for the period of two years, and atleast 3 different antiepileptics drugs have been used adequately, with full compliance and with therapeutic levels in blood. Epileptic syndromes, structural brain lesions and neurodegenerative diseases are known for intractable epilepsy. Therapeutic options in intractable epilepsy e.g. Drugs, Surgery, Ketogenic diet.

Various modalities are used for identification of etiology of epilepsy like CSF examination, EEG, ultrasonography, CT scan, MRI of which, MRI is more sensitive and specific than CT scan and shows posterior and temporal fossa clearly and provides multiplanar imaging with excellent spartial and contrast resolution without repositioning of patient.[11,12,13]

Prognosis depends upon the type of epilepsy and age of presentation. World epilepsy day is celebrated on March 26th every year and it is also known as Purple Day.

The present study is attempted to highlight the importance of clinical findings and role of EEG and CT scan and MRI in diagnosis of epilepsy.

MATERIAL AND METHODS

This was prospective study carried out at Civil hospital, Ahmedabad of 1 year duration from January 1,2020 to December 31,2020 . The study was approved by the Ethical Committee of B.J. Medical College, Ahmedabad. All the patients in age group of 1 month to 12 years having two and/or more unprovoked seizures and who were already enrolled in epilepsy clinic were included in present study. Neonates ,febrile seizure patients, conditions mimicking epilepsy were excluded from the study. All the patients who already had done their MRI and/or CT scan report and EEG were taken into study.

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Aims and Objectives

- To study the proportion of epilepsy in children.
- To study the epidemiological profile of different epilepsy
- To study various types of epilepsy and correlation with MRI, CT SCAN, EEG findings.
- To study the Effectiveness of various Anti epileptic drugs in different types of epilepsy

Statistical analysis:

All the results were expressed in numbers and percentages. The data was analysed by using Microsoft excel database.

RESULTS

Table 1: Incidence of epilepsy among study.

Total no of patients	No. of CNS patients.	No. of patients of epilepsy	Percentage
6930	825	163	2.35%

Epilepsy constitutes 2.35% of total admission and 19.75% of total CNS cases.

Table 2: Sex distribution in study

Male	97 (60%)
Female	66 (40%)

Males are more affected than females.

Table 3: Classification according to Type of epilepsy in various age groups

Types of epilepsy	1 month-1 year	1 year - 5 year	5 year-10 year	>10 year
Generalized (n=128)	38 (29.68%)	52 (40.6%)	32 (25%)	6 (4.6%)
GTC (n=124)	37 (28.9%)	52 (40.6%)	29 (22.6%)	6 (4.6%)
Myoclonic (n=04)	1 (0.78%0	0	3 (2.34%)	0
Clonic(n=0)	0	0	0	0
Atonic (n=0)	0	0	0	0
Absence (n=0)	0	0	0	0
Partial (n=35)	2 (5.7%)	18 (51.42%)	11 (31.4%)	4 (11.4%)
Simple partial (n=13)	01 (2.85%)	04 (11.42%)	06 (17.14%)	02 (5.7%)
Complex partial (n=20)	01 (2.85%)	13 (37.2%)	04 (11.42%)	02 (5.7%)
Partial with seconday generalization (n=02)	0	01 (2.85%)	01 (2.85%)	0
Idiopathic	0	0	0	0

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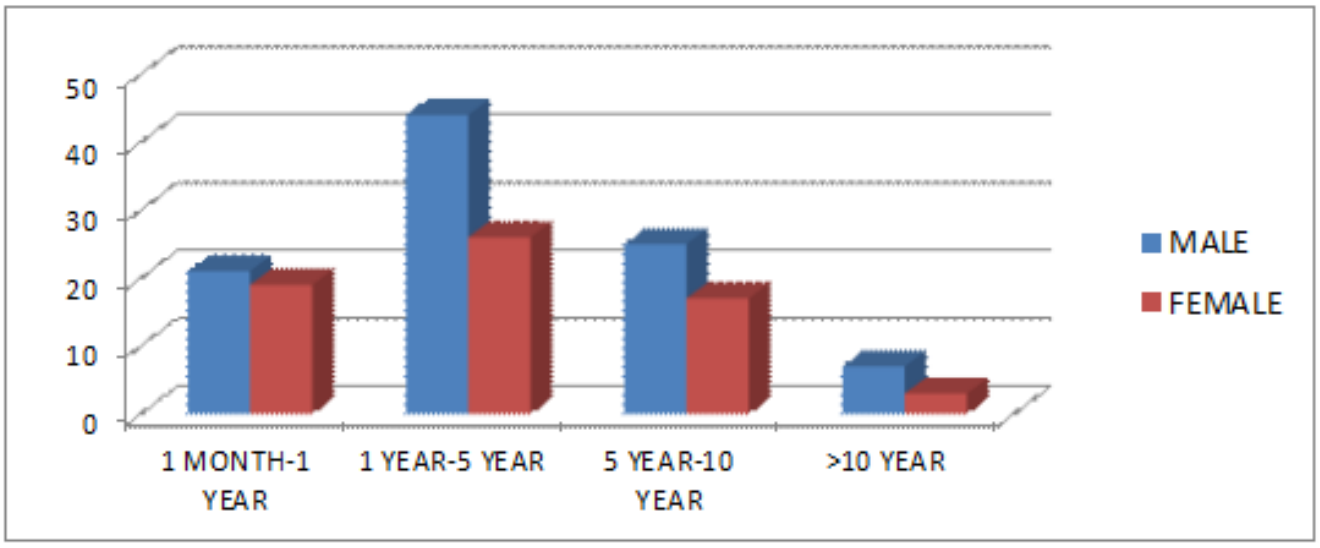

Out of 163, 128 patients (78.52%) were of generalized epilepsy in which generalized tonic clonic epilepsy is most common type. 35 patients were of partial epilepsy. Most common age group of presentation is 1 month - 5 years followed by 5-10 years. High incidence in <5 year is due to central nervous system immaturity

Table 4: Precipitating factors in Epilepsy.

Precipitating Factors	**Generalized epilepsy (n=128)**	**Partial epilepsy (n=35)**
Inadequate drug dose	45 (35.1%)	16 (45.7%)
Drug defaulter	30 (23.4%)	13 (37.1%)
Fever	27 (21%)	05 (14.2%)
Unprovoked	15 (11.7%)	02 (5.7%)

In present study inappropriate dosing and drug defaulter are in the highest number of frequency as a precipitating factor in both generalized and partial.

Table 5: Developemental delay in epilepsy:

Development History	**No. of patients(n=163)**	**%**
No delay	118	77.30%
Delay	45	22.70%

Out of 163 patients 45 patients (22.70%) have developmental dealy.

Table 6: EEG findings

	n= 163(%)	**Generalized (n=128)**	**Partial (n=35)**
Normal	40 (24.5%)	33	07
Abnormal	123(75.46%)	95	28

Present study shows out of 163 patients, 123 patients (75.46%) have abnormal EEG. Most common EEG findings were bifrontoparietal spike followed by focal slow/spike wave.

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Table 7: MRI results and type of epilepsy

MRI results	Generalized epilepsy (n=128)	Partial epilepsy (n=35)	Total
Normal (n=70)	54	16	70
Abnormal (n=37)	30	07	37

Table 8: MRI findings in patients of epilepsy

MRI findings	Generalized epilepsy	Partial epilepsy	No. of patients(n=107)
Acute infarcts	02	01	03(2.80%)
Encephalomalacia	04	0	04(3.73%)
Gliosis	10	02	12(11.21%)
Corpus callosum agenesis	02	0	02(1.86%)
Cortical atrophy	03	0	03(2.80%)
Hypoxic injury	09	01	10(9.35%)
Mesial temporal sclerosis	00	02	02(1.86%)
Neurocysticercosis	00	01	01(0.9%)
Normal	54	16	70(65.42%)

In this study, MRI findings are normal in 70(65.4%) patients. Out of 37 abnormal reports, 12 patients (11.21%) are of gliosis while 10 patients (9.35%) are of hypoxic injury.

Table 9: CT scan results and type of epilepsy

CT scan resuly	Generalized epilepsy (n=128)	Partial epilepsy (n=35)	Total
Normal	28(21.9%)	8(22.8%)	36
Abnormal	16(12.5%)	4(11.42%)	20

Out of 56 CT scan done, 20 were abnormal.

Table 10: Classification according to no. of drugs intake

	No of patients(n-163)	%
Monotherapy	107	65.64%
Polytherapy	56	34.35%

Present study shows that out of 163 patients, 56 patietns on polytherapywhile 107 (65.6%%) are on monotherapy.

Table 11: Classification according to type of drug and no of patient

Name of drug	No of patients(n=163)
Valproate	125 (76.68%)
Carbamazepine	35 (21.47%)
Phenytoin (eptoin)	15 (9.20%)
Levetiracetam (levipil)	19 (11.65%)
Clobazam	22 (13.49%)

Majority of patients are prescribed with valproate (76.6%).

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DISCUSSION

The present study included 163 patients from age group >1 month- 12 years with incidence of epilepsy being 2.35%. Most commonly affected group is of >1 year- 5 years (42.94%). Male: female ratio was 1.46:1. According to ILAE-2017 classification of epilepsy,[8] incidence of Generalized tonic clonic type is highest (76.07%) followed by complex partial epilepsy (12.26%) followed by simple partial epilepsy (7.97%). In this study, Birth asphyxia is the most common cause of symptomatic epilepsy (56.14%). Age of onset of seizure is important factor in delayed development, 36.84% patients develop delayed development in whom 1st attack of seizure was before 5 year of age. 75.46% patient had abnormal EEG. Most commonly EEG findings were bifrontoparietal spike followed by focal slow/spike wave.[12] In this study, MRI findings are normal in 70 (65.4%) patients. Out of 37 abnormal reports, 12 patients (11.21%) are of gliosis while 10 patietns (9.35%) are of hypoxic injury. In this study, total 56 patients CT scan were done, out of them 36 (64.28%) had normal CT scan. Out of 163 patients, 65.54% patients on monotherapy which suggest that single drug can effective in most of the epilepsy patients if it is taken in appropriate dose regularly. Most common drug used in generalized epilepsy is valproate while in partial epilepsy is carbamazepine.[3,4] Most common precipitating factor for hospitalization is for generalized epilepsy is drug defaulter while in partial epilepsy most common factor is inadequate drug dose.

CONCLUSIONS

Epilepsy is associated with social stigma of false handicaps, which can be avoided by educating parents, teachers, families and friends. Any potential abilities should be actively developed to give every child with epilepsy a hope for the future.

Neuro imaging study helps in the establishment of possible etiology, MRI is most important modality amongst all. In patients with persistent seizures those do not respond to medical therapy, it helps to localize an epileptic focus for surgicalremoval.

In present study, majority of patients are on monotherapy that suggest that effective drug in appropriate dose can manage control of further seizure episode.

Limitations

- Newborns and >12 year old adolescent were not studied.
- The study did not include long term follow up to chemotherapy and neuro developmental outcome.
- The institute does not have 24 hours EEG monitoring facility

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