

ORIGINAL RESEARCH

A study of young adult onset seizures with special reference to MRI findings

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ABSTRACT

Introduction: Globally, seizures are common disorders recognized since antiquity and are encountered frequently during medical practice. The highest incidence occurring in early childhood and late adulthood. Currently up to 10% of general population experience at least one seizure in their lifetime with the highest incidence occurring in early childhood and late adulthood. Seizures beginning in the adult life require special attention as regards to their etiology because these are likely to be due to an identifiable and treatable cause. These are mainly trauma, central nervous system infections, space-occupying lesions, cerebrovascular accidents, metabolic disorder and drugs etc. In addition, the etiology and clinical profile of seizures in adults necessitate decisions about the initiation and discontinuation of pharmacotherapy. All patients with adult onset seizures should have a neuroimaging study to determine whether there is an underlying structural abnormality or not.

Magnetic resonance imaging (MRI) can identify structural etiology of seizure and guide clinicians in the determination of treatment and prognosis because of its superior sensitivity and specificity. **Materials and methods:** This was a cross-sectional observational study conducted over a period of 2 years at AMCMET Medical college, Ahmedabad. Data were collected from the young adult onset seizure patients who underwent MRI brain. Patients with previous history of seizure and/mental disability excluded from study. Detailed history and clinical examination, routine laboratory investigations, Magnetic resonance imaging (MRI) and Electro encephalography (EEG) were done on all patients. **Results:** Out of 200 patients 58% of the patients were between the age group 20-30 years of age, 46.4% were males and 53.5% were females. Majority patients 58.5% had generalized tonic-clonic seizure. Metabolic causes constituted an important etiology (50%) of adult onset seizures. Abnormal EEG and MRI brain were found in 39.5% and 46% of patients respectively. Abnormal MRI findings like, gliosis (5.5%), tuberculoma (5.5%), CVST (5.5%), Medial temporal lobe sclerosis or hippocampal abnormality (5%) Infarct (3.5%) posterior reversible encephalopathy syndrome (3.5%), Neurocysticercosis (3.5%), cerebral atrophy (3%), ICH (3%), calcified foci (0.5%), Hyperintense lesion in right parietal region (0.5%), , Meningioma (0.5%), , subdural hemorrhage and cerebral oedema (2.5%), meningitis (2.5%), SAH (2%), Correlation of MRI and EEG showed that 50.5% had EEG and MRI both normal. 36% had EEG and MRI both abnormal. **Conclusion:** It was found that no specific etiology to be prevalent in patients with young adult onset epilepsy. Hence a complete work up ranging from proper history taking, clinical features and radiological investigation should be done.

Key words: Seizure, Magnetic resonance imaging (MRI), central nervous system infections

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INTRODUCTION

Globally, seizures are common disorders recognized since antiquity and are encountered frequently during

medical practice. The highest incidence occurring in early childhood and late adulthood. Currently up to 10% of general population experience at least one

seizure in their lifetime with the highest incidence occurring in early childhood and late adulthood. Seizures beginning in the adult life require special attention as regards to their etiology because these are likely to be due to an identifiable and treatable cause. These are mainly trauma, central nervous system infections, space-occupying lesions, cerebrovascular accidents, metabolic disorder and drugs etc. In addition, the etiology and clinical profile of seizures in adults necessitate decisions about the initiation and discontinuation of pharmacotherapy.^[1,2] All patients with adultonset seizures should have a neuroimaging study to determine whether there is an underlying structural abnormality or not. Magnetic resonance imaging (MRI) can identify structural etiology of seizure and guide clinicians in the determination of treatment and prognosis because of its superior sensitivity and specificity^[3]

The present study was aimed to study clinical profile of patients with young adultonset seizure and to determine etiology of seizure by correlating the clinical and neuroimaging (MRI) data.

METHODOLOGY

This is a cross sectional observational study which was conducted over a period from 1stSeptember 2016 to 31st December 2018, at L.G. General Hospital and AMC MET MEDICAL COLLEGE after obtaining institutional ethics committee approval.

INCLUSION CRITERIA

1. All Patients with first time seizure episode during study period.

2. Patients in age group of 20-40 years.
3. Patients whose MRI study of brain were done.

EXCLUSION CRITERIA

1. Patients age less than 20 years and greater than 40 years at presentation.
2. Patients with mental disability and / previous history of seizure
3. Patients who refused to give consent for study.

STUDY DESIGN

200 subjects with diagnosis of seizure with affirmed inclusion and exclusion criteria were recruited during study period from outdoor and indoor departments. Approval was obtained from Institutional Review Board and informed consent of all patients was taken. Detailed history was taken and clinical examination were done for all patients. Routine laboratory investigations were done of all patients along with ECG and 2Decho wherever necessary. Magnetic resonance imaging (MRI) and Electro encephalography(EEG) were done in all study patients. The etiology of seizures was determined on the basis of medical history ,neurological examination , the MRI scan and EEG recording . In all cases the seizure type and the classification of risk factors were done according to International league against epilepsy.^[2]

STATISTICAL ANALYSIS

Data entry was done in MS excel and computation including proportions and values were calculated using the appropriate statistical software.

Age groups	N=200	(%)
20 to 30 years	116	58
31 to 40 years	84	42
Mean±SD	29.3±6.9	
Gender wise		
Male	93	46.5%
Female	107	53.5%

Type of Seizures	N=200	(%)
Generalised Tonic clonic seizure	117	58.5%
Simple Partial Seizure	11	5.5%
Complex partial seizure	20	10%
Secondary generalized seizure	42	21%
Myoclonic seizure	7	3.5%
Status Epilepticus	3	1.5%

Risk Factors	N=200	(%)
Alcohol Withdrawal	26	25.7%
Hepatic encephalopathy	25	24.8%
Hypocalcemia	15	14.9%
Hypoglycemia	9	8.9%

Hyponatremia	9	8.9%
Hypertensive Encephalopathy	8	7.9%
Hyperglycemia	5	4.9%
Uremic Encephalopathy	4	4%

Table 4: Type of seizures in study subjects

Type of seizures	N=200	(%)
Generalized tonic-clonic seizure	117	58.5%
Simple partial seizure	11	5.5%
Complex partial seizure	20	10%
Secondary generalized seizure	42	21%
Myoclonic seizure	7	3.5%
Status epilepticus	3	1.5%

Table 5: Table showing correlation of MRI and EEG in study subjects

EEG findings	MRI normal		MRI abnormal		Total
EEG normal	101	50.5%	20	10%	121
EEG abnormal	7	3.5%	72	36%	79
Total	108	54%	92	46%	200

Table 6: Individualized MRI findings

MRI findings	N=200	(%)
Gliososis	11	5.5%
Atrophy/Cerebral atrophy	6	3%
Calcified foci in right parietal region	1	0.5%
Central venous sinus thrombosis(CVST)	10	5%
Hyperintense lesion in right. Parietal region	1	0.5%
Infarct	7	3.5%
Meningioma	1	0.5%
Medial temporal lobe sclerosis/ hippocampal abnormality	10	5%
Neurocysticercosis.	7	3.5%
SDH and cerebral oedema	5	2.5%
Tuberculoma	11	5.5%
Meningitis	5	2.5%
Posterior reversible Encephalopathy syndrome	7	3.5%
Subarachnoid hemorrhage	4	2%
Intracerebral hemorrhage	6	3%
Normal neuroimaging study	108	54%

RESULTS

The following results were found from the cross sectional study on 200 seizure patients coming to tertiary care hospital of Ahmedabad Municipal Corporation.

58% (n=116) of the patients were between the age group 20-30 years of age, while 42% (n=84) of patients were from the age group of 31-40 years. Out of 200 patients, 46.4% (n=93) were males and 53.5% (n=107) were females. The distribution according to socio economic status was found to be very varied and mostly the subjects belonged to lower economical class 90.50% and only a meager 9.5% belonged to middle economical class.

According to our study, metabolic causes constituted

an important etiology 50% (n=101) of adult onset seizures. Of these 101 such cases, alcohol withdrawal 25.7% (n=26), and hepatic encephalopathy 24.8% (n=25), hypocalcemia 14.9% (n=15), hypoglycemia 8.9% (n=9), hyponatremia 8.9% (n=9), hypertensive encephalopathy 7.9% (n=8), hyperglycemia 4.9% (n=5) uremic encephalopathy 4% (n=4) were the common causes.

58.5% (n=117) had generalized tonic-clonic seizure, 5.5% (n=11) had simple partial seizure, 10% (n=20) had complex partial seizure, 21% (n=42) had secondary generalized seizure, 3.5% (n=7) had myoclonic seizure and 1.5% (n=3) had status epilepticus.

Abnormal EEG was found in 39.5% (n=79) of

patients and normal EEG was found in 60.5% (n=121) of patients. Normal MRI was found in 54% (n=108) of patients and 46% (n=92) of patients had abnormal MRI findings. Correlation of MRI and EEG showed that 50.5% (n=121) had EEG and MRI both normal. 3.5% (n=7) had EEG abnormal and MRI normal. 10% (n=20) had EEG normal and MRI abnormal. 36% (n=79) had EEG and MRI both abnormal.

54% (n=108) patients had normal MRI, while the rest showed abnormal MRI findings like, gliosis 5.5% (n=11), cerebral atrophy 3% (n=6), calcified foci 0.5% (n=1), CVST 5% (n=10), Hyperintense lesion in right parietal region 0.5% (n=1), Infarct 2.5% (n=5), Meningioma 0.5% (n=1), Medial temporal lobe sclerosis or hippocampal abnormality 5% (n=10), Neurocysticercosis 3.5% (n=7), subdural hemorrhage and cerebral oedema 2.5% (n=5), tuberculoma 5.5% (n=11), meningitis 2.5% (n=5), posterior reversible encephalopathy syndrome 3.5% (n=7), SAH 2% (n=4), ICH 3% (n=6).

DISCUSSION

Globally, seizures are common disorders recognized since antiquity and are encountered frequently during medical practice; up to 10% of general population experience at least one seizure in their lifetime with the highest incidence occurring in early childhood and late adulthood. Seizures beginning in the adult life require special attention as regards to their etiology because these are likely to be due to an identifiable cause. These are mainly due to trauma, central nervous system (CNS) infections, space-occupying lesions, cerebrovascular accidents (CVA), metabolic disorders, and drugs. On the other hand, seizures beginning in childhood are more likely to be idiopathic. In addition, the etiology and clinical profile of seizures in adults necessitate decisions about the initiation and discontinuation of pharmacotherapy that are different from those in younger patients.^[1,2]

All patients with adult onset seizures should have a neuroimaging study to determine whether there is an underlying structural abnormality or not. For evaluation of adults with new onset seizures, magnetic resonance imaging (MRI) has been shown to be superior to computed tomography (CT) scan for the detection of cerebral lesions causing seizures.

The importance of adult onset seizures stems from its frequent association with secondary causes. With history, clinical examination, and appropriate investigations, including neuroimaging, if proper analysis of etiology is made, the presenting seizures can be treated accordingly, thus reducing associated morbidity and mortality.

In the current study, we observed that 58.5% subjects belonged to the age group 20-30 years and 41.5% subjects belonged to the age group 30-40 years. This was in correlation to the study by Sheikh et al (2017)^[3] and Paliwal et al (2017)^[4] Similarly, other studies reported higher percentage of cases in the age

group of <40 years^[5,6]. Majority of studies from India recorded a higher prevalence during the second decade of life^[7-10]. In the present study, gender wise distribution showed that the females suffering from epilepsy were higher in comparison to the males. In a study by Mani et al (1998)^[7] the prevalence per 1000 was found to be 4.38 among males and 3.4 among females. This discrepancy can be attributed to the lower F:M ratio in the state of Gujarat. Also it could be related to sex hormones in the females but more research is needed in this field. According to our study, metabolic causes constituted an important etiology (50%) of adult onset seizures. This was in accordance to the studies Paliwal et al (2017)^[4], in which alcohol withdrawal and hyponatremia were the most common causes.

On the EEG, it was found that 61% had no EEG changes and 39% had abnormal EEG wave pattern. In a study by Sheikh et al (2017)^[3], routine EEG was positive in 53% of cases and this result was 35% in study by Paliwal et al (2017)^[4] cancel^[15,16]. In the current study, 48% cases showed abnormal MRI findings. Similarly Sheikh et al (2017)^[3] found that MRI was conclusive in 60% of cases and this result thus indicate that MRI is the investigation of choice. The types of abnormal MRI findings ranged from gliosis, Central Venous Sinus Thrombosis, Mesial temporal Lobe Sclerosis, Tuberculoma, Neurocysticercosis, Posterior Reversible Encephalopathy Syndrome to Infarct, cerebral atrophy, Subdural hemorrhage, intracerebral hemorrhage. The same results were obtained in a study by Sendil et al (2014)^[11]. In some studies like in Kanitkar et al (2013)^[12], stroke was a common etiological factor followed by idiopathic factors. Kumar JM (2017)^[13] showed the findings of Neurocysticercosis (50%), Tuberculoma (20%), Stroke (10%), brain tumor and abscess (3.33% and 3.33% respectively).

Generalized tonic-clonic seizures were the predominant seizure type overall, encountered in 58.5% patients. Narayanan and Murthy (2007)^[14] Kanitkar et al (2013)^[12], Sendil et al (2014)^[11] and Hirani and Shrivastva (2015)^[15] also reported higher prevalence of generalized tonic-clonic seizures in adults (55%, 70%, 64%, and 60%, respectively). Nicolson et al (2003)^[16], found higher number of patients with tonic clonic seizures. Sheikh et al (2017)^[3] showed the prevalence of Generalized tonic-clonic seizure to be 48.6% and the rest namely Complex partial, Secondary generalized, Secondary partial, Status epilepticus and Myoclonic seizures comprised 30%.

CONCLUSION

Epilepsy is a chronic non communicable disease of brain and nearly 80% of people with epilepsy live in low and middle income countries. The risk of premature death in people with epilepsy is quite higher than for the general population. In the present

study we found that no specific etiology to be prevalent in patients with young adult onset epilepsy, as it is multifactorial. Hence a complete work up ranging from proper history taking, clinical features and radiological investigation should be done.

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