Pattern of seizure cases in tertiary care hospitals in Karnataka state of India

Nitin Joseph, Ganesh S. Kumar[1], Maria Nelliyanil[2]

Departments of Community Medicine, Kasturba Medical College, Manipal University, Mangalore, [1]JIPMER, Puducherry,
[2]A.J. Institute of Medical Sciences, Mangalore, Karnataka, India

Abstract

Background: The prevalence and incidence of epilepsy is higher in developing countries than in developed countries. Understanding pattern and risk factors of seizure cases will help in suggesting appropriate preventive measures. **Objectives:** This study was carried out to assess the pattern of seizure, its management and compliance with treatment. **Materials and Methods:** Data from medical records of seizure cases in three tertiary care hospitals of Mangalore city in south India admitted from January 2006 to December 2011 were collected and analyzed. **Results:** Nearly half (44.4%) of the 196 cases belonged to productive age group (15-45 years) and 2/3rd (60.7%) were males. Majority (>80% cases) were unskilled workers and of low socio-economic status groups. Family history of seizures was present in 8.4% cases. Mean age of onset of seizure was found to be 19.9 years. Proportion of generalized tonic clonic seizure cases was 78.1%. Secondary seizures were seen in 66 (33.7%) cases with the most common cause being trauma to the head (24.2%). Refractory seizures were present in 2.7% cases. Monotherapy was the most commonly followed treatment regimen and phenytoin was the most popular anti-epileptic drug (AED) used. Non-compliance with AEDs was seen in 18.1% cases and was more among patients on polytherapy ($P = 0.032$). **Conclusion:** Seizure manifestations and treatment compliance vary widely in the studied population. In depth analysis of each seizure type will give more information about the factors associated with it.

Key Words

Compliance, hospital based, risk factors, seizures, treatment

For correspondence:
Dr. Nitin Joseph, Department of Community Medicine, Kasturba Medical College, Manipal University, Light House Hill Road, Mangalore, Karnataka, India. E-mail: drnitinjoseph@gmail.com

Introduction

Epileptic seizure is a chronic neurological disorder that affects people of all ages. Around 50 million people world-wide have epilepsy.[1] The prevalence and incidence of epilepsy is higher in developing countries than in developed countries. However, in developing countries, given the high incidence of epilepsy, the prevalence is relatively low, which may be due to the poor prognosis and high mortality for people with epilepsy.[2,3] This poor prognosis is mainly because of a large treatment gap along with poor health seeking behavior of people.[2]

It is necessary to understand the pattern of seizures at a tertiary care level, so that the appropriate interventional measures according to the type of seizures and other issues may be

addressed. Very few studies have been conducted in India in this regard.[4] Besides, there is a need for strengthening services towards treatment and follow-up of this vulnerable group due to socio-economic factors and other factors.[5] With this background, the present study was conducted to assess the pattern of seizure cases in three main tertiary care hospitals in Mangalore city situated in Karnataka state of south India.

Materials and Methods:

This hospital based retrospective study was conducted in three tertiary care hospitals affiliated to a medical institution namely Government Wenlock Hospital, KMC Hospital Attavar and KMC Hospital Ambedkar Circle during April and May 2012. Ethical clearance was obtained from the institutional ethics clearance committee. The records of all seizure cases admitted in these hospitals from January 2006 to December 2011 were collected and analyzed.

At the first step, permission was obtained from the medical superintendents of the respective hospitals. Data pertaining to the said period were collected and recorded in a semi-structured proforma. Variables included the data related to socio-demographic characteristics, types of seizures, age

of onset, clinical manifestations, associated causes or factors, associated morbid conditions, abnormal blood investigation findings, pattern of treatment and follow-up. The cases were ascertained by care providers based on history as well as electroencephalogram (EEG) examination following admission. Clinical features of seizures in the records were determined based either on the patient account, witness account or by direct observation on admission. History of non-compliance with treatment was also obtained from the records. Socio-economic status was analyzed using Modified BG Prasad Classification of 2004.[6] Active epileptic seizure was defined as the previous episode occurring within 5 years of current episode. Refractory epilepsy or chronic epilepsy was defined as history of one or more seizures per month in spite of treatment with at least two anti-epileptic drugs (AEDs) for one or more years. Secondary seizure cases were those whose underlying cause for seizure was known. Compliant patients were those who did not miss or stop the medication for more than a month.

The data were entered and analyzed using SPSS version 16.0. Data were presented as categories and percentages. For testing association, Chi-square test was used and *P* value less than 0.05 were taken as statistically significant association.

Results

Of the 196 seizure cases, nearly half 87 (44.4%) belonged to productive age group (15-45 years). Almost 2/3rd of cases, i.e., 119 (60.7%) were males and 77 (39.3%) were females (*P* = 0.042) [Table 1]. Mean age of the subjects was 24.1 years (SD = 18.9 years). Mean duration of seizures was 6.3 years (SD = 8.3 years) and median duration was 3 years. Mean number of episodes was 4.5 (SD = 8.3) and median number of episodes was 2 among 59 subjects with this available information. 34 (91.9%) out of 37 cases were active cases of epileptic seizures. 86.7% cases were unskilled workers and 82.9% cases belonged to low socio-economic status [Table 2]. Family history of seizures was present in 16 (8.4%) out of 191 cases. Mean age of onset of seizure was 19.9 ± 18.8 years. Age of onset was below 5 years in about 1/3 of cases (34.7%) [Table 3]. Proportion of generalized tonic clonic seizure (GTCS) cases was 153 (78.1%).

Clinical features seen significantly more among GTCS was up-rolling of the eyes followed by urinary incontinence and salivation. In cases of ordinary partial seizures salivation was the most common clinical presentation, whereas in tonic seizures it was cyanosis. Among cases of absence seizures it was day dreaming and in cases of myoclonic seizures it was jerky movements of the extremities [Table 4]. Causes of seizures were idiopathic in 130 (66.3%) cases and secondary in 66 (33.7%) cases. The most common causes of secondary seizures were head trauma 16 (24.2%), central nervous system infection 11 (16.7%) and alcohol addiction 10 (15.1%). The other causes were fever 8 (12.1%), birth asphyxia 6 (9.1%), metabolic diseases 5 (7.6%), developmental diseases 4 (6.1%), neurocysticercosis 2 (3%), drug withdrawal 2 (3%), drug abuse and tumor in one case each. Among the 5 cases with metabolic cause as the precipitating factor, hypoglycemia was the reason in two cases and alkalosis among the rest.

Among the associated disease conditions, diabetes mellitus was present in 5 cases, hypertension in 13 cases, human immunodeficiency virus infection in 2 cases, protein energy

Table 1: Age and sex distribution of seizure cases

Age	Male (%)	Female (%)	Total
0-4 years	27 (69.2)	12 (30.8)	39
5-14 years	24 (61.5)	15 (38.5)	39
15-44 years	41 (50)	41 (50)	82
45 years and above	27 (75)	9 (25)	36
Total	119	77	196

χ^2=8.22, DF=3, *P*=0.042

Table 2: Socio-economic status of seizure cases (*n*=140)

Socio-economic status	Number of subjects	%
Below poverty line	5	3.6
Poor	111	79.3
Lower middle	19	13.6
Upper middle	5	3.6

Table 3: Age of onset of seizure among cases

Age of onset	0-5 years	5-15 years	15-25 years	25-35 years	>35 years	Total
Total (%)	68 (34.7)	31 (15.8)	36 (18.4)	18 (9.2)	43 (21.9)	196

malnutrition in 1 case, microcephaly in 2 cases, behavioral abnormalities in 11 cases, attention deficit hyperactive disorder in 1 case, mental retardation in 8 cases, loss of memory in 5 cases and depression in 9 cases. All cases with behavioral abnormalities presented with GTCS. Attention deficit hyperactive disorder which was seen only in one case presented with GTCS. Mental retardation was associated with 8 cases, 6 of which presented with GTCS and one case each as atonic and complex partial seizures. Out of the 5 cases with the loss of memory, 4 had GTCS and 1 had complex partial seizures. Out of 9 cases with depression, 4 had GTCS, 2 had simple partial seizure and 3 had complex partial seizure. Among the precipitating factors for seizures, stress was the cause in 2 cases, sleep deprivation in 5 cases, fever in 7 cases, travel and exertion in 1 case each.

History of status epilepticus was present in 40 (20.4%) cases. Type of drug administered for management of this condition was carbamazepine in 7 (17.5%) cases, phenytoin in 13 (32.5%) cases and benzodiazepines in 20 (50%) cases. History of Todd's palsy was present in 30 (15.3%) cases. Refractory epilepsy was present in 5 (2.7%) out of 182 cases. EEG was found to be abnormal in 8 (47.1%) out of 17 patients, computed tomography (CT) abnormal in 8 (33.3%) of 24 patients and magnetic resonance imaging (MRI) abnormal in 1 out of 3 patients in whom it was carried out. Most common blood examination finding was low bicarbonates levels seen in 48 (24.5%) followed by hypochloremia 21 (10.7%) and hyponatremia 18 (9.2%).

Alternate system of medicine for case management was carried out in 6 (3%) cases. Of this, 4 patients (3 with GTCS and 1 with absence seizures) had taken ayurvedic treatment and 2 (both with GTCS) had taken homeopathic treatment.

Monotherapy regimen was seen significantly more in all types of seizures except tonic seizures where two drug therapies with AEDs were more commonly used [Table 5].

Table 4: Clinical pattern in various types of seizures

Types of epilepsy	Aura	Uprolling of eyes	Loss of consciousness	Salivation	Incontinence	Drowsiness	Cyanosis	Muscle flaccidity	Jerky movement	Day dreaming	Blinking	Vertigo	Total
Tonic	0	0	0	0	0	0	2	0	0	0	1	0	3
Tonic clonic	0	12	4	5	6	3	1	2	0	0	0	0	33
Myoclonic	0	0	0	0	0	0	0	0	2	0	0	0	2
Atonic	0	1	0	0	0	0	0	0	0	0	0	0	1
Absence	0	0	0	0	0	0	0	0	0	2	0	0	2
Simple	0	1	0	2	0	0	0	0	1	0	0	1	5
Complex	1	1	0	0	0	1	0	0	0	0	0	0	3
Partial seizures with secondary generalization	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	1	15	4	7	6	4	3	3	3	2	1	1	50

Overall, Phenytoin was the most common drug used 141 (71.9%) followed by Benzodiazepines 122 (62.2%). Other commonly used drugs were Barbiturates 53 (27%), Carbamazepine 25 (12.8%), and Sodium Valproate 24 (12.2%). Out of 127 seizure cases, 104 (81.9%) patients were compliant with the AEDs. Compliance rate among patients on monotherapy was 48 (90.6%) as compared to 56 (75.7%) among patients on polytherapy ($\chi^2 = 4.62$, DF = 1, $P = 0.032$).

Discussion and Conclusion

The study highlights the current scenario of the pattern of seizure cases in a tertiary care setting and emphasizes the need for further strengthening of services towards this condition. The fact that seizures affects commonly the productive age group and occurs due to secondary causes in over a third of cases are issues for concern.

A recent meta-analysis study showed that the age-specific prevalence rates were higher in the younger age group, with the onset of epileptic seizures reported mostly in the first three decades of the sample population's lives.[7] Mean age of onset of epilepsy was 14.8 years in contrast to our study (19.9 years).[8] A study carried out in Jaipur,[9] India showed that the sex ratio (Male:Female) was 2:1 and a high proportion of cases (62.83%) were from low socio-economic group which was similar to our findings. As younger age group and people of poor socio-economic group are more affected by this condition economic deprivation in the family could be more grievous. Family history of epilepsy in a study carried out in Sudan was present in 20% cases, which were higher than our observations. However the proportion of seizure cases due to secondary causes in the Sudan based study was same as that of ours.[10] Hence if measures are taken to correct these underlying factors we can avoid almost a third of seizure cases in the future.

Head trauma followed by (CNS) central nervous system infection and alcohol consumption were the most common cause of secondary epilepsy in this study. However, the study carried out in Sudan[10] reported cerebrovascular accidents (10%) followed by CNS infections like meningitis or encephalitis (5.9%) and previous history of head trauma and alcohol consumption (each in 4.2% cases) as the most common cause of secondary epilepsy. A community based study carried out in Kerala state of India showed that the proportion of generalized and localization-related epilepsies was 58.8% and 30.6%, respectively.[11] In contrast, another study carried out in Eastern India[12] showed that 81% seizure cases were GTCS, 17.7% partial and 1.3% myoclonic seizures. The varying proportion of cases may be due to the difference in the pattern of admission or referral services.

A study done in Jaipur[4] and Sudan[10] found that EEG was abnormal in 58.9% and 64.8% epilepsy patients, which were higher than our findings. CT was abnormal in 33.5% cases in Jaipur based study[4] similar to our findings, but the Sudan based study[10] found it in 16.7% cases, which was lower than our observations.

Low catchment of epileptiform EEG graphoelements in patients with solitary unprovoked seizure shows the importance of

Table 5: Relation between types of seizures and types of drug regimen

Type of epilepsy	Mono drug therapy	Two drug therapy	Three drug therapy	More than three drugs	Total
Tonic	1	3	2	0	6
Tonic clonic	83	42	19	9	153
Myoclonic	2	1	1	1	5
Atonic	3	2	0	0	5
Absence	2	0	0	1	3
Simple	5	4	1	0	10
Complex	4	2	3	0	9
Partial seizures with secondary generalization	1	1	0	0	2
Infantile	0	0	3	0	3
Total (%)	101 (51.5)	55 (28.1)	29 (14.8)	11 (5.6)	196

χ^2=36.1, DF=24, *P*=0.05

precise history in diagnostics of these patients and confirmed that MRI examination in-patients who experienced solitary unprovoked epileptic seizure is undoubtedly the first choice method.[9]

Blood investigations in the present study found a fall in bicarbonate levels followed by hypochloremia and hyponatremia as the most common findings among epileptic patients. This was different from the observations of a study done in Egypt where it was hypercalcemia, hypernatremia and hypokalemia.[13]

The Other studies[4,8,12] found that monotherapy treatment regimen was used in a greater proportion of seizure cases ranging from 71.7% to 92.4%, which was higher than our observations. This preference towards the single-drug approach in the majority of patients could be because polytherapy exposes the patients to unnecessary hazards like drug allergy, drug interactions, non-compliance and cost. In this study phenytoin followed by benzodiazepines and barbiturates were the most commonly used AEDs. In another study carried out in Burdwan,[12] India phenytoin followed by sodium valproate and clobazam were the commonly used AEDs. Newer AEDs like levitrazetam were not used at all in epilepsy management. Another study reported that newer AEDs were used only in less than 5% patients.[8] As phenytoin and phenobarbitone are easily available and are inexpensive they are the drugs most often used in developing countries,[3] which was in accordance to our findings. These observations support the need for up gradation in drug regimen periodically for improvement in seizures management.

In a study carried out in Burdwan,[12] India most patients with GTCS and partial seizures were put on phenytoin which was similar to our findings but management for myoclonic seizures was mostly by sodium valproate, which was different from ours.

The non-compliance rate of 12.7% and the finding that patients on monotherapy were significantly more compliant (95.3%) than patients on polytherapy (77.8%) as reported in Burdwan study[12] was similar to our findings. There is a need to minimize noncompliance rate by educating patients about the importance of adherence with AEDs even during periods of normality to avoid recurrent attacks. Probably use of monotherapy would help in minimizing non-compliance as supported by the observations in this study. A meta-analysis study found that the treatment gap was more than 70% in the rural areas.[7] Furthermore, studies done in most (SEAR) South East Asian Region member countries has revealed that nearly 50 to 80% of people with epilepsy do not receive systematic treatment and among those who are on treatment, nearly 40% to 70% drop out at various stages of treatment resulting in the recurrence of seizures.[14] In view of the above findings, it is insisted that proper diagnostic techniques, supervision and follow-up of patients are crucial parameters required for quality improvement of services of this group.

Since, this is a hospital based study the findings may not reflect the pattern of seizure in any geographical area. However, as the study settings were three main tertiary hospitals in Mangalore city, the seizure scenario of most cases in Mangalorean population during the study period might have been reflected in the findings of this study.

Furthermore, as information was obtained from medical records information on certain aspects was either not mentioned or were found missing in some records. These included missing information on socio-economic data such as educational status, socio-economic status, environmental factors such as living conditions, etiological factors like dietary and sleep deprivation habits, reasons for non-compliance with AEDs and side-effects experienced by AEDs.

In spite of these limitations, this study gives valuable information on different aspects of seizures pattern factors associated and treatment compliance, which will help in better understanding and management of seizures in future.

Acknowledgment

References

1. Mental Health: Epilepsy World Health Organization; 2012.

Available from: http://www.who.int/mental_health/neurology/epilepsy/en/index.html. [Last cited on 2012 Jun 12].

2. Bharucha NE. Epidemiology of epilepsy in India. Epilepsia 2003;44 Suppl 1:9-11.
3. Carpio A, Hauser WA. Epilepsy in the developing world. Curr Neurol Neurosci Rep 2009;9:319-26.
4. Panagariya A, Surekha RK, Sharma B, Hrishikesh K, Agarwal N. Clinical profile of epilepsy, in a tertiary care centre of North-west India. J Indian Med Assoc 2011;109:14-8.
5. Das K, Banerjee M, Mondal GP, Devi LG, Singh OP, Mukherjee BB. Evaluation of socio-economic factors causing discontinuation of epilepsy treatment resulting in seizure recurrence: A study in an urban epilepsy clinic in India. Seizure 2007;16:601-7.
6. Agarwal A. Social classification: The need to update in the present scenario. Indian J Community Med 2008;33:50-1.
7. Sridharan R, Murthy BN. Prevalence and pattern of epilepsy in India. Epilepsia 1999;40:631-6.
8. Thomas SV, Sarma PS, Alexander M, Pandit L, Shekhar L, Trivedi C, *et al.* Epilepsy care in six Indian cities: A multicenter study on management and service. J Neurol Sci 2001;188:73-7.
9. Kollar B, Martiniskova Z, Klobucnikova K, Vachalova I, Waczulikova I. Solitary epileptic seizures in the clinical practice. Part II: Findings of various modifications of EEG examination and imaging methods in patients who experienced solitary unprovoked epileptic seizure. Neuro Endocrinol Lett 2009;30:487-90.
10. Hussein A, Eltahir A, Yasin F, Malkaldar M, Sidig A, Mubark B, *et al.* Clinical presentation of epilepsy among adult sudanese epileptic patients. Sudan J Med Sci 2007;2:21-3.
11. Radhakrishnan K, Pandian JD, Santhoshkumar T, Thomas SV, Deetha TD, Sarma PS, *et al.* Prevalence, knowledge, attitude, and practice of epilepsy in Kerala, South India. Epilepsia 2000;41:1027-35.
12. Sil A, Das K, Das NK, Chakraborty D, Mazumdar G, Tripathi SK. Use of anti-epileptic drugs in a tertiary care hospital of Eastern India with emphasis on epilepsy due to neurocysticercosis. Indian J Pharmacol 2012;44:106-10.
13. Hamed SA, Abdellah MM, El-Melegy N. Blood levels of trace elements, electrolytes, and oxidative stress/antioxidant systems in epileptic patients. J Pharmacol Sci 2004;96:465-73.
14. Satishchandra P, Gururaj G, Mohammed QD, Senanayake N, Silpakit O. Global campaign against Epilepsy: Out of the shadows. WHO Regional Office for South-East Asia; 2001. Available from: http://209.61.208.233/LinkFiles/Health_and_Behaviour_WHO-Epilepsy.pdf. [Last cited on 2012 Jun 12].