**Introduction**

Acute symptomatic seizure can be defined as seizures that are provoked, situation related occurring in close temporal relationship to a systemic or neurological insult directly or indirectly. Those affecting directly are due to denovo CNS disease like meningitis, encephalitis, stroke and head injury. Those affecting indirectly are systemic disorders leading to disordered homeostasis affecting the nervous system.

**Aims:**

To study the etiologic profiles of acute symptomatic seizures in adults aged more than 18 years of age.

To analyze the age / sex distribution, presenting history, clinical findings and investigations at admission in the study group.

**Settings and Design:**

The study was done in the setting of the Institute of Neurology Government General Hospital, Chennai. The study was observational in nature designed to analyze patients in age group more than 18 years of age and who presented with first onset seizures without history of trauma as cause of seizure. The sample size was 150 and the study period was from July 2005 to March 2007.

**Material And Methods**

The sample size was 150 and the study period was from July 2005 to March 2007.
be habituated to their use. Seizures associated with acute drug intake were classified as toxic. Eclampsia Peripartum seizures associated with other symptoms of eclampsia such as proteinuria and hypertension. Encephalopathic Seizures attributed to insults at the time of or after acute, deprivation generally associated with global perfusion failure (cardiac arrest) or selective deprivation (respiratory arrest).

**Exclusion Criteria** -
History of seizure associated with trauma:
Clinical data was collected from patients and witnesses in a systematic manner and added to a database, which included a checklist of seizure antecedents and the symptoms associated with seizure. The first task was to ascertain if at all, the presenting complaint is a seizure. In a few instances, even when the presenting history was ambiguous seizure recurrences were witnessed for confirmation. The clinical diagnosis on the seizure type, whether partial or generalized was made. In-depth probes in the history for provocation factors and features suggesting organicity were attempted. Significant past medical history if any were noted. A thorough clinical examination was performed at the time of admission and relevant findings recorded. A routine metabolic screening, which included blood sugar, urea, serum creatinine, electrolytes and liver function tests (if indicated), were done at the time of admission. Lumbar puncture and CSF analysis was done if infective etiologies were suspected. Earliest possible EEG was attempted and was performed using 32 channel digital EEG recorder. CT brain plain study in all patients and contrast studies when necessary were done in all patients in the study group. MRI brain was done when indicated. Limitations were encountered in affordability of patients for MRI scanning. Early EEG (within 24 hours of onset of seizures) could not be performed due to delay in referral of the patients to this institution and because of the time taken for stabilizing patients. EEG could not be done in some cases owing to emergency surgical interventions.

**Statistical analysis used:**
The data was entered in MS Excel and appropriate simple frequencies and statistical were used for data analysis.

**Results**
**AGE AND SEX:** Seizures in 150 patients in the age group of 18 to 82 are studied; of which 88 are males and 62 are females. ( males : females  1.4:1.) Demographic profile of male patients shows maximum frequency was in the age group 61-70 years closely followed by 31-40 years and 41-50 years. Demographic profile of female patients shows maximum number of cases in the age group 51-60 years, closely followed by 61-70 years and 21-30 years. Of the 150 patients maximum number of cases were in the age 61-70 years age group followed by age group 51-60 years.

**SEIZURE TYPES FOUND IN THE STUDY:** The seizures are grouped as per international league against epilepsy-revised classification of epileptic seizures as partial seizures and generalized. Generalized seizures seizures were observed in 103 (68.67%) partial seizure were seen in 47 (31.33%) of the study group.

**THE PROFILES OF SIGNIFICANT PAST MEDICAL HISTORY OBSERVED IN THIS STUDY:** Past medical history showed 14 patients to be having diabetes and hypertension, diabetes alone in two and hypertension in six. Pulmonary tuberculosis was present in nine and connective tissue disorder in five and heart disease in four. During an emergency evaluation of patients at admission vital signs were monitored which revealed 16% of patients were hemodynamically unstable. Neurological examination revealed abnormality in 65% of patients. Motor system abnormalities were present in 48% patients, 39% had altered sensorium, 19% had signs of meningeal irritation, 13% had cranial nerve abnormalities and cerebellar signs were present in two patients.

**METABOLIC ABNORMALITIES IN PATIENTS AT AdMISSION:** Metabolic abnormalities at the time of admission were investigated, as they are among the most readily treatable causes of seizures. The abnormalities in metabolic parameters were noted in 40 patients in this study. Hypoanemia and hypoglycemia was present in 13 patients each. Renal failure and Hypokalemia in three each.

EEG in the study: EEG was taken after stabilizing the patient and all were taken in the inter ictal period. EEG was done in 117 of the 150 patients (78%) in this study. Abnormalities were found in 69 of 117 patients subjected to EEG. The most common observed pattern in EEG was a diffuse slow wave pattern during the inter ictal period.

**IMAGING ABNORMALITIES IN THE STUDY GROUP:** Cortical atrophy in 57 (41%), infarct in 35 (23.33%), Parenchymal hemorrhage in 5 (6%), Tumours in 18 (12%) was found in combinations with various other findings. CT scan brain was done in all the patients in the study group. MRI scanning of brain was done only in 34 patients of the study group. MRI was done only in necessary cases when CT was not fully contributory. Besides improvement in details of CT findings MRI was helpful in uncovering lesions missed in CT.

**NEW LESIONS UNCOVERED IN MRI:** MRI brain revealed new lesions in 16 patients. Five each infarcts and...
granulomas were deducted in patients in whom CT brain was normal. Two each cases of CVT and encephalitis and one each of tumour and AV malformation were detected anew by MRI brain. The most common OI was pulmonary tuberculosis

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<td></td>
<td></td>
<td></td>
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<td>Female</td>
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Table 1 - Etiology Profiles In The Study Group With Mean Age (N=150)

Others include, Tumour + Metabolic-1, CVT + Metabolic 1, CTD + Metabolic -1, Toxic 1, TIA -1, Drug Induced -2, Inf+CV A 1

Five of the 150 patients presented with status epilepticus (one CVT, two Eclampsia and two hypoxic encephalopathies). At least one recurrence in the month following first seizure was noted in 61 (41%) patients. In hospital death occurred in two patients who were admitted for first seizures,One eclampsia patient and another hypoxic encephalopathy following coronary artery disease.

Discussion

The study group comprised of 58.67% males and 41.33% females. Most authors report a small-to-moderate preponderance of men in their studies of first seizures in adults (van Donselaar1, 1992; Musicco2, 1997; Hopkins3, 1988; King4, 1998). A male to female ratio of 1:4:1 is observed in this study, a trend noted in other studies. Analyzing the age groups in this study the maximum incidence of first onset of seizures is found in the age interval of 61 to 70 years. Studies have shown that incidence of new onset seizures above age 65 is even higher than first year of life – 135 per 100000 vs. 79 per 100000. In females the incidence was higher in 51-60 age group and equal to that of 61-70 in 21-30 years age group. The mean age for most of the common etiologies in this study was 51-60. The less common etiologies in this study, in seizures due to infective etiology, CVT, Hypoxic encephalopathy & AVMs, seizures occurred at mean age of 31-40 years. In eclampsia and CTD patients seizures occurred at the earliest age (25 years) in this study. The seizure type classified in this study as per International League Against Epilepsy-revised classification of epileptic seizures revealed generalized seizure in 68.67% and partial seizure in 31.33%.

Zhu PG5 studied new onset seizures in the ages between 20 and 80 revealed generalized seizures in 64% and partial in 30%. Retrospective study of Perez et al6 in 250 patients with late onset seizures revealed 59% generalized and 41% partial in nature. The observation of seizure types in this study is almost similar to the above-mentioned studies. In contrary, a recent study of Perez Lopez 6 identified partial seizures as the most common seizure type in adults. Infective etiology accounted for 14.67%, which formed the second largest group in this study. Of the 22 patients 10 had tuberculous meningitis, six had pyogenic meningitis and six had encephalitis (two had HSV encephalitis). Metabolic abnormalities contributed to etiology in 13% of patients and most of them were readily treatable, hence a thorough search for these factors should be the early priorities. The most common metabolic abnormality was hyponatremia which was often encountered as an associated finding with other etiologies. Two patients had drug induced seizures, one developed seizures after intravenous lignocaine when he was admitted for the treatment of myocardial infarction and another after flourescin angiography done in opthalmic hospital. The most common abnormality in EEG was diffuse slowing of background activity. Anti-convulsant drugs slow the normal background rhythm in EEG and almost 80% of the patients in the study group were under the anti convulsant drugs when EEG was performed, which explains the predominance of diffuse slowing pattern in the EEG. When the other investigations were inconclusive, “focal findings in the EEG originating from the temporal lobes” were recorded in two patients, which helped in the diagnosis of encephalitis. CT scan was done in all patients in the study group, in which the abnormalities contributed to the etiologies in 42% of pa-
patients. Cerebral atrophy (41%) was the most common abnormality present in the scan report but had no relevance with any etiology.

Abnormal CT findings in this study included infarct (23.33%), tumors (12%), parenchymal hemorrhage (06%) and ring enhancing lesions (03.33%) CT findings in the study of new onset seizures by Sayette V8 et al found cerebral atrophy in 29%, CVA in 75%, tumors in 5%. The spectrum of CT findings differs from this study in that cortical atrophy is more, CVA almost the same and tumors are also more in this study. Etiologic profiles revealed CVA, tumors, metabolic causes, CNS infections and alcohol withdrawal seizures contributing to 68% in this study. CVA was the single most common etiology uncovered in this study. In the Minnesota study 9, the most prevalent underlying condition accounting for seizures in the elderly was stroke. Of the patients in the CVA group, 28 had infarcts and five had hemorrhages. Twenty eight patients presented with acute symptomatic seizures at the onset of the stroke. Lesser and coworkers suggested that the acute and delayed post stroke seizures have different mechanism, the former related to “transient cytotoxic metabolic alterations” and latter to structural changes, especially extravasations of blood and deposition of iron. Tumors contributed to 12.67% of etiologies in this study. Of the 19 patients with tumors, 16 had primary CNS tumor against three patients diagnosed to have secondaries. Tumor as etiology in various studies are as follows, Montréal neuro institute 36% (study age over 50), Mayo clinic 22% (study age over 60), Liege Belgium study (age 55 to 64) 21%, Glasgow Scotland 12% (study age - elderly) and Denver general hospital 1% (study age over 69). Tumor as etiology in adult patients lies between 1% and 36% in various studies and the result of this study (12.67%) lies somewhere in the midpoint of this spectrum. Hyponatremia, hypoglycemia, hyperglycemia and renal failure contributed to 13% of seizures in the study. They were the most readily treatable causes, especially those patients detected to have hypoglycemic seizures. Hence a review at the metabolic parameters at admission is mandatory and when detected is most rewarding for the treating physician.

History was the tell tale evidence in patients diagnosed to have alcohol related seizures which formed 10% of etiologies. Of the 14 alcohol related seizures 12 had withdrawal seizures and two had alcohol excessive intake causing seizures. Alcohol related seizures were present in 2 females. Granulomatous etiology for first onset seizure was found in 06.67 percent of the study group. Of the ten patients six had neurocysticercosis and 4 had tuberculomas in brain. Seizure was associated with CTD 1% patients all of whom were young females with mean age of 25 years. Infective etiology accounted for 14.67%, which formed the second largest group in this study. Of them 10 had tuberculous meningitis, six had pyogenic meningitis and six had viral encephalitis (two had herpes Simplex infection).

Results:

The mean age of patients in the commonly encountered etiologies, in the study was around fifty to sixty years. The mean age of CTD as etiology, was the least in this study. Generalized seizures (68.67%) were the most common seizure type encountered in the study. Limb weakness and headache were among the most common non-convulsive presenting symptom. In the clinical examination, motor system abnormality was the most consistent factor that predicted an abnormal CT scan. EEG, which was done in 78% of the patients in the study recorded abnormalities in 59%. Cerebrovascular accidents were the most frequent etiology for the first onset seizure in adults in this study. Literature reveals a great diversity in the proportions of tumors forming etiology of seizures in later ages (1% to 36%). This study estimated tumors as etiology in 12.67% of patients. CVA, CNS infections, tumors, metabolic causes and alcohol withdrawal formed 75% of the etiology of seizures. In this study, 8% (twelve patients) mandated neuro-surgical intervention. Metabolic abnormalities contributed to etiology in 12.67% of patients. CT detected abnormal lesions in 42% of cases. MRI was instrumental in uncovering new lesions in 16 patients.

Conclusion

In a patient with new onset seizures more than 18 years, all efforts to identify the etiology should be made. Given the age of patients more than eighteen years with a seizure care should be taken to look out for treatable causes. Thorough search to rule out metabolic factors and infective causes as cause for seizures should be an early priority as these conditions are treatable. CT brain and MRI are indispensable in patients more than 18 years with new onset seizures.

References

2) Muscico M, Beghi E, Solari A, Viani F: Treatment of first tonic-clonic seizure does not improve the prognosis of epi-


5) Zhu PG Neurology Department, Tong Ji Hospital, Tong Ji Medical university, Wuhan. PMID;2282883.


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