Original Artcle

Etiological study of seizure disorders among patients attending the epilepsy clinic of an urban center in Eastern India

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Background : The etiology of seizures range from perinatal hypoxia and developmental disorder in neonates, febrile seizures in children, CNS infections, trauma, head injury and brain tumors in adolescence, and cerebrovascular accidents and Alzheimer's disease in the elderly. Understanding the etiology of seizure is useful in clinical practice, to fine tune therapeutic interventions.

Materials and Methods : We studied 85 new cases attending the Epilepsy Clinic of Bangur Institute of Neurology, Kolkata and Murshidabad Medical College, Berhampore for one year, and attempted to establish the etiology of seizures in this population.

Results : Out of the 85 cases enrolled 39 (46%) had generalized seizures and 46 (54%) suffered from localization related epilepsy (focal or partial seizures). Analysis of our data revealed that idiopathic seizures were the commonest (85%), followed by congenital (10%), vascular (1%) and degenerative (1%), among cases with generalized seizures. However, among the patients presenting with partial seizures, idiopathic, congenital and degenerative were equally common (20% each), followed by traumatic (13%), neoplastic (10%) and infective (9%).

Conclusions : Idiopathic causes are more important in the domain of generalized seizures while secondary causes like idiopathic, congenital and degenerative etiologies tend to be more common in partial seizures.

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Key words **: Epilepsy , Seizure disorder, Etiology of seizure disorder, Seizure semiology.**

In ancient Greece as now people spoke of "having seized" and of having had an "attack"[1]. Epilepsy is a group of neurologic conditions, the common and fundamental characteristic of which is recurrent, usually unprovoked epileptic seizures. Epileptic seizure represents the clinical manifestation that result from excessive synchronous, abnormal firing patterns of neurons that are located predominantly in the cerebral cortex. Such abnormal paroxysmal activity is usually intermittent and self limited[1,2,3]. In 1981, the International League Against Epilepsy (ILAE) published a modified version of International Classification of Epileptic seizures in 1981 and revised expanded version in 2017 that still provides the fundamental of seizure classification till date[4,5] (Tables 1&2).

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Editor's Comment :

- **The etiology of seizures remains unknown in most clinical care settings.**
- **This study documents that, among patients presenting with seizures, the commonest cause seems to be idiopathic, followed by congenital, degenerative, traumatic and neoplastic in decreasing order of frequencies.**
- **Focusing on generalized seizures, the idiopathic form dominates further, followed by degenerative as a relatively remote cause.**
- **In contrast, when partial seizures are considered in isolation, idiopathic, congenital and degenerative causes seem equitably distributed as common entities, followed by traumatic, neoplastic and infective causes, in successive decreasing sequence.**

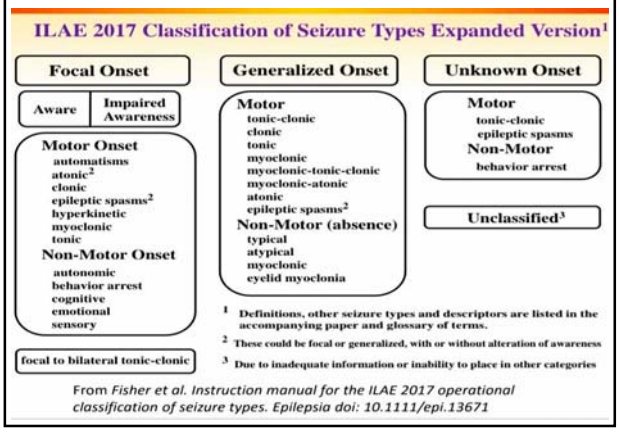
Materials and Method

This was a hospital based observational study conducted at the Epilepsy Clinic of Bangur Institute of Neurology, Kolkata, and the Departments of Physiology and Medicine, Murshidabad Medical College, Berhampore, over a period of one year. 85 consecutive new patients attending the clinic with undiagnosed seizure disorders were selected and seizure type established through detailed history and clinical examination. Patient suffering from syncope,

Table 1 — *ILAE classification of seizures, 1981*

Partial seizures	• Simple partial seizure • Complex partial seizure • Partial seizure with secondary generalization
Primarily generalized seizure	• Generalized tonic clonic seizure • Tonic seizure • Atonic seizure • Myoclonic seizure • Absence seizure
Unclassified seizure	• Neonatal seizure • Infantile spasm

Table 2 — *ILAE classification of seizures, 2017*



From *Fisher et al. Instruction manual for the ILAE 2017 operational classification of seizure types. Epilepsia doi: 10.1111/epi.13671*

conversion disorder, heart block, movement disorders and metabolic disorders likely to precipitate seizures were excluded from this study. Appropriate blood tests along with EEG, brain CT Scans (plain and contrast) and brain MRI were performed to establish the cause of the seizures.

Results and analysis

The mean age in our study population was 38.7 ± 8.2 years, with the mean age among cases with generalized and partial seizures being 49.2 ±7.8 and 29.6 ± 5.5 years respectively.

Out of the 85 cases enrolled 39 (46%) had generalized seizures and 46 (54%) suffered from localization related epilepsy (focal or partial seizures) (Fig 1). Among those with generalized seizures, 33 had idiopathic seizures while only 9 had idiopathic seizures among those with partial seizures, giving a total of 42 cases (49%) of idiopathic seizures in the study. The other common etiologies of seizures in the study population were congenital (15%), degenerative (12%), traumatic (7%) and neoplastic (6%) (Table 3, Fig 2).

Analysis of our data revealed that idiopathic seizures were the commonest (85%), followed by congenital (10%), vascular (1%) and degenerative (1%), among cases with generalized seizures. However, among the patients presenting with partial seizures,

Table 3 — *Etiology of seizures in study population (n = 85)*

Etiology	Incidence	Etiology	Incidence
Idiopathic	42 (49%)	Traumatic	6 (7%)
Congenital	13 (15%)	Neoplastic	5 (6%)
Degenerative	10 (12%)	Infective	4 (5%)
Vascular	3 (4%)	Others	2 (2%)

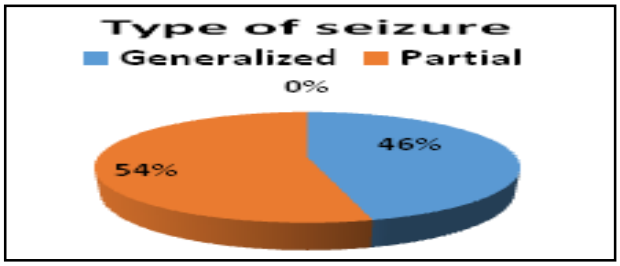


Fig 1 — Distribution of generalized and partial seizures in the study

idiopathic, congenital and degenerative were equally common (20% each), followed by traumatic (13%), neoplastic (10%) and infective (9%) (Table 4). The etiology of seizures was much diverse in the partial seizure subgroup in contrast to the overwhelming majority of idiopathic seizures among those with generalized seizure presentation.

Discussion

Despite the plethora of knowledge on this subject, a substantial percentage of patients will remain classified as suffering from idiopathic seizures[6]. Looking into the genetic basis of seizures, different studies have made it clear that seizure are caused mostly by polygenic defects[7,8,9]. All factors that can affect the brain ie, head trauma, neoplasms, degenerative diseases, infections, metabolic diseases, ischemia and hemorrhages etc can predispose a person to epilepsy[10]. It is also known that certain brain areas eg, temporal and frontal lobes are more susceptible to produce epileptic seizure activity than the others.

We performed a detailed neurological workup before investigations in our effort to establish the cause of seizures. The neurological examination assesses focal

Table 4 — *Seizure etiology among patients with generalized and partial seizures*

	Generalized seizures (n = 39)	Partial seizures (n = 46)
Idiopathic	33 (85%)	9 (20%)
Congenital	4 (10%)	9 (20%)
Vascular	1 (2.5%)	2 (4%)
Neoplastic	0	5 (10%)
Degenerative	1 (2.5%)	9 (20%)
Infective	0	4 (9%)
Traumatic	0	6 (13%)
Others	0	2 (4%)

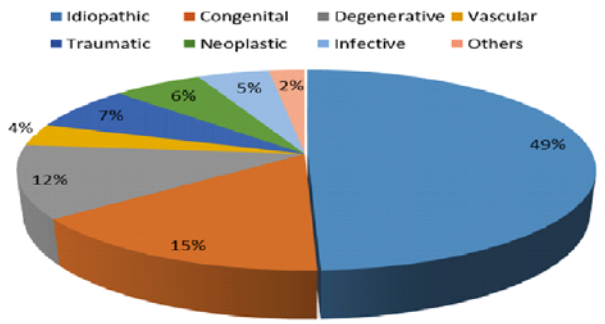


Fig 2 — Etiology of seizures in study population (n = 85)

signs that might implicate or localize cerebral pathology. Increased tone on one side of the body could indicate pathology in the contralateral hemisphere, such as a cortical dysplasia. The general physical examination is also important to determine whether the patient has an underlying condition. Abnormal skin markings could indicate a neuro-cutaneous disorder in which epilepsy is common, such as tuberous sclerosis or neurofibromatosis.

In a study from Rochester, Minnesota, the incidence of partial seizure was 57%, generalized seizure 40% and 3% was unclassifiable[11]. Our data is similar to this experience with 46% having generalized and 54% partial seizures at presentation. The preponderance of idiopathic seizures in the generalized seizure subgroup is in keeping with data from across the world. Even in the developed nations, population studies reveal no identifiable cause of seizures in 55% to 89%. However, the proportion of cases with an antecedent identifiable cause of seizure is relatively consistent, ranging from 23 – 39%.

Among the patients presenting with partial seizures in our study, idiopathic, congenital and degenerative were equally common (20% each), followed by traumatic (13%), neoplastic (10%) and infective (9%). This is in keeping with international trends where more identifiable causes can be established during the management of partial seizures, as opposed to the management of generalized seizure disorders. It is also important to note that despite the study being conducted in a government teaching hospital of India, infections contribute relatively less to the etiological spectrum of seizure disorders. It is well known that infections like Tuberculoma, HSV encephalitis or brain abscess may all present with partial seizures. These, along with other causes of seizures, are important to identify as potentially treatable with appropriate medical or surgical options.

Age remains an important consideration in the management of seizures. In children epilepsy associated with neurological deficits from birth was found to be the most important single etiological relationship, whereas cerebro-vascular disease is the most commonly identified cause among adults. In the renowned Rochester, Minnessota study conducted between 1935 and 1984, 65.5% of seizures were idiopathic/cryptogenic, 10.9% were of vascular origin, 8% congenital, 5.5% traumatic, 4.1% neoplastic, 3.5% degenerative and 2.5% infective[10]. An identifiable lacunae in our study was the selection of cohort from a tertiary level referral clinic which does not reflect the population at large.

Conclusions

We conclude that partial seizures are commoner than generalized seizures, and tend to occur in younger age groups. Idiopathic causes are more important in the domain of generalized seizures while secondary causes like idiopathic, congenital and degenerative etiologies tend to be more common in partial seizures.

Limitations of study :

(1) Only patients attending tertiary care centre were taken.

(2) Everyone could not afford MRI (at that time MRI was not free).

(3) Some of the patients did not had the patience for MRI.

(4) CT SCAN could not be done in patients less than 1 year of age due to radiation hazard.

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Conflict of Interest : None

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