

## Original Article

### Etiological Profile of New Onset Seizures above 60 Years of Age

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**Background :** Seizure in elderly is quite frequent and potentially problematic to identify the cause. New Onset Seizure (NOS) is defined as the first Seizure or the first cluster of Seizures within a 24-hour period ever experienced by the patient. With increasing age, the prevalence and incidence of epilepsy and Seizures increases correspondingly. New-onset Epilepsy in elderly people often has the following etiology, including Cerebrovascular Diseases (Ischemic Stroke, Hemorrhagic Stroke & Cerebral Venous Sinus Thrombosis), Intracerebral Tumors and Traumatic Head Injury. In addition, an acute symptomatic Seizure cannot be considered Epilepsy, which presents usually as a common symptom secondary to metabolic, infection or toxicity causes in older people, which needs extreme attention and treatment. Adult-onset Seizure disorder is a major public health concern in terms of burden of disease, nature of illness and its impact on individual, family and community. This study was done to assess the clinical and etiological profile causing new onset Seizure in patients above 60 years of age and to find opportunities to control epileptic Seizures.

**Methodology :** This study was carried out in Saveetha Medical College Hospital and Research Institute for 100 patients with New Onset Seizure (NOS) who are more than 60 years of age. It is a Prospective, Observational hospital based clinical study conducted from August, 2020 to August, 2021. We excluded the patients with known case of Childhood Epilepsy, Movement Disorder, Pseudo Seizure, Hyperventilation, or Narcolepsy and those who did not give consent. Neurological examination, laboratory, neuroimaging, and electroencephalogram investigation was done in all the patients to find out the etiology.

**Results :** A hundred patients were divided into three groups as group A (aged 60-65 years), group B (66-70 years), and group C (aged above 70 years). Out of 100 patients, 61(62.4 %) were males and 39 (37.5%) were females. Stroke was the most common etiology of NOS (40%), followed by idiopathic (26%) metabolic causes like hyperglycaemia, hypoglycaemia, hyponatremia, and hypocalcemia (24%), traumatic brain injury (4%), neoplasm and infection 3%. Among these cases, NOS was found in 45% of cerebrovascular disease, 25% in TBI, 67% in neoplasm, 38% in Idiopathic. In our study, frequency of epilepsy was <2 in 67% and >2 in about 33%. The most common type of Seizure was focal to bilateral tonic-clonic Seizure (70%), followed by focal Seizure (18%) and generalized Seizure (12%). Nearly 64% had abnormal neuroimaging, Hypertension was the most common co-morbidity (33%).

**Conclusion :** The present study proposes that Epilepsy in the elderly patients have etiological relationship with Stroke, Metabolic, Neoplasm and Idiopathic. The incidence of first ever Seizure among elderly is as high as among young children and mortality of untreated seizure among the elderly is remarkably higher. The natural history and outcome of new onset seizure among elderly has been the subject of many recent studies. Epileptic seizures in the elderly are recognized as frequent but potentially difficult and burdensome to diagnose. Their clinical features and relevant diagnostic problem remain poorly investigated in hospital populations outside the setting of tertiary referral centers. This study was undertaken to determine the clinical characteristics and etiology of NOS's/Epilepsy in the elderly in a university hospital setting.

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**Key words :** New Onset Epilepsy, Seizures, Cerebro Vascular Disease, Idiopathic, Elderly.

Seizures are most common disease affecting 10% of the general population. In contrast to earlier findings that Seizures being a disease of children, data from geriatric population found increased occurrence

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#### Editor's Comment :

- New onset seizure above 60 years is not very uncommon.
- One should be extra precautions while taking history and ruling out all structural and metabolic causes before diagnosing idiopathic seizures in elderly.

of New Onset Seizure (NOS)<sup>1</sup>. 1 to 3 per 1000 geriatric person per year has NOS and this is 2-6 times greater than young adults<sup>2</sup> and mortality of untreated Epilepsy among the Elderly is remarkably higher. Care of the Elderly is an emerging health concern as the number

of Elderly persons will rise approximately 140 million by 2021<sup>3</sup>. Though Seizure research is common, very few were done on the etiological profile of NOS<sup>4</sup>. NOS is defined as the first Seizure or the first cluster of seizures within a 24-hour period ever experienced by the patient<sup>5</sup>.

NOS is manifested by two or more recurrent unprovoked Seizures. It may be of other secondary origin due to cerebral neoplasm, systemic disorder and infection which needs special treatment<sup>6</sup>. Seizures in the elderly are recognized as frequent but potentially difficult and burdensome to diagnose. The aim of the present study is to rule out the cause and risk factors to diagnose and treat the geriatric population with NOS at the earliest.

### MATERIALS AND METHODS

This study was an observational hospital-based study carried out in tertiary health care center. Geriatric subjects above 60 years with NOS were included in this study. Subjects with Movement Disorder, Hyperventilation, Pseudo Seizure, Narcolepsy and those who did not give consent were excluded from our study. 100 patients were included and divided into three groups as group A (aged 60-65 years), group B (66-70 years) and group C (>70 years). Prior to the data collection Institutional Ethical Committee approval was obtained. Patients and eyewitness were interviewed, history elicited and clinical examination was done. Complete Blood Count, Urea, Serum Creatinine, Blood Glucose Level, Serum Electrolytes Like Sodium, Potassium and Calcium were done. Routine investigations and Special investigations like EEG and Neuroimaging was also done.

### Statistical Analysis :

Statistical analysis was done using SPSS 21. All continuous variables were expressed as mean  $\pm$ SD. Qualitative data were expressed as percentage significant.

### RESULTS

In 50% of our study population belonged to 60-65 years age, 31% between 66-70 years and 19% of them were above 70 years age group. 62% of our study population was males (Table 1).

We have observed that the commonest form being focal to bilateral tonic-clonic Seizures affecting 63% of our subjects, 21% of them had focal Seizures and 16% had generalized Seizure. 67% of our study population had less than two episodes of Epilepsy. Only a minority of elderly individuals had fever (3%), Headache (26%) and Vomiting (17%). 33% had past

history of hypertension and 62% of them had no personal history of smoking and alcohol (Table 2).

The pattern of etiology in males and females were similar in this study. Most common etiology in males was CVA (38.7% & 42.1%) in which major contributor was ischemic stroke (29% & 31.6%) followed by hemorrhage stroke (08.1% & 05.3%) and CVT (1.6% & 05.3%). Metabolic seizures comprised about 17% and 18.4% respectively. Idiopathic origin was seen in 24.2 % of males and 18.4% of females, followed by neoplasm (0.32% & 2.6%) and infection (01.6% & 5.3%). 12.8 % had alcohol withdrawal Seizure (Table 3).

Stroke contributes around 40% of NOS, followed by Idiopathic (26%) and Metabolic derangement (24%). Traumatic brain injury contributes only 4% and 3% were due to infection and neoplasm (Fig 1).

Among CVA, majority were due to infarct (30%), followed by Hemorrhage (7%) and Cerebral Venous Thrombosis (3%). Among Metabolic Seizures (24%) 11% were of hyperglycaemic Seizures, 6% of Hypoglycemic Seizures and 1% of cases had Hyponatremia and Hypocalcemia respectively. In 4%

Table 1 — Demographic profile of the patients

Gender	Age group			Total N (%)	$\chi^2$	p-value
	60-65 N (%)	66-70 N (%)	>70 N (%)			
Male	31 (62)	16 (51.6)	15 (78.9)	62	2.454	0.293
Female	19 (38)	15 (48.4)	04 (21.1)	38		
Total	50	31	19	100		

Table 2 — Clinical History of the patients

Clinical History	Frequency
<b>Seizure :</b>	
Focal	21
Focal to bilateral tonic -clonic seizure	63
Generalized	16
<b>Number of Episode :</b>	
$\leq 2$	67
$>2$	33
<b>Fever :</b>	
Present	03
Absent	97
<b>Headache :</b>	
Present	26
Absent	74
<b>Vomiting :</b>	
Present	17
Absent	83
<b>History :</b>	
No Complication	32
Hypertension	33
Diabetes mellitus	15
Hypertension & Diabetes	20
<b>Personal History :</b>	
No bad habit	62
Smoking, Alcohol, Tobacco	17
Smoking + Alcohol + tobacco	21

Table 3 — Gender wise distribution of etiology

Category :	Gender		Total N (%)
	Male N (%) 62	Female N (%) 38	
Idiopathic	15 (24.2)	11 (28.4)	26
Infection	01 (01.6)	02 (05.3)	03
Metabolic	17 (27.4)	07 (18.4)	24
Neoplasm	02 (03.2)	01 (02.6)	03
Stroke	24 (38.7)	16 (42.1)	40
TBI	03 (04.8)	01 (2.6)	04
<b>Etiology :</b>			
Alcohol with drawl seizure	04 (12.8)	0	04
Cancer breast with cerebral METS	0	02 (05.3)	02
Cancer lungs with cerebral METS	01 (1.6)	0	01
Cerebral Vascular Accident + Haemorrhage	05 (08)	02 (05.3)	07
Cerebral Vascular Accident + Infarction	18 (29.0)	12 (31.6)	30
Cerebral Vascular Thrombosis	01 (1.6)	02 (05.3)	03
Hyperglycaemia Hyper osmolarity	05 (08)	06 (15.6)	11
Hypo Calcemia	0	01 (02.6)	01
Hypoglycaemia	06 (09.7)	0	06
Hyponatremia	01 (1.6)	0	01
Idiopathic	15 (24.2)	11 (28.9)	26
Meningitis	01 (1.6)	0	01
TBI	03 (04.8)	01(02.6)	04
Uremic Encephalopathy	01 (1.6)	0	01
Tuberculoma	01 (1.6)	01 (05.3)	02

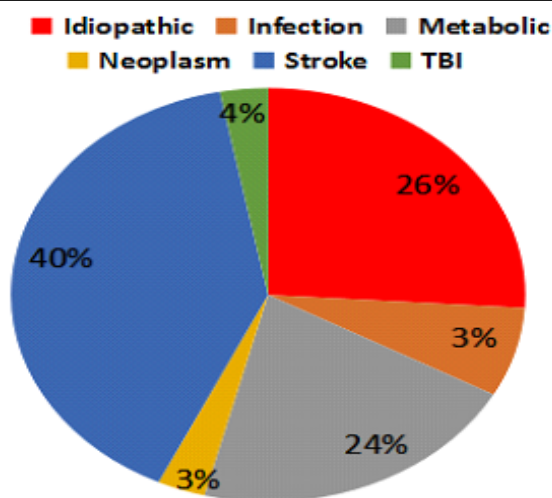


Fig 1 — Distribution of various etiologies of people with seizures

of the cases the cause for seizures was alcohol withdrawal. Neoplasms (Cerebral Metastasis) and infections (Tuberculoma, Meningitis) were the other minor causes of Seizures (Table 4).

64% of our subjects had abnormal neuroimaging findings. 30% had ischemic infarcts, 7% had hemorrhage and 4% of patients had ICH, SAH, SDH and EDH (Fig 2).

Among our subjects, 81% patients had normal EEG, while abnormalities of EEG were found in 19%. Focal delta activity Frontal spike, focal theta activity occupies the top three position (Fig 3).

From Fig 4 we noted the maximum conversion of seizure into Epilepsy on Neoplasm (67%) followed by CVD (45%), Idiopathic (38%), and TBI (38%) (Fig 4).

**DISCUSSION**

There are only few prospective incidence studies exists to find out the cases with first Seizures in the adult population<sup>7</sup>. So, we intended to do the current study aimed on etiological profile of NOS in Elderly population.

According to 2010, ILAE Commission, classified Seizures into three major categories based on etiology (symptomatic, Metabolic and Idiopathic)<sup>8</sup>. We have evaluated data of 100 geriatric patients with NOS, in which males were 62% and females were 38%. Kaur S, *et al* and Chalasani S, *et al* also reported similar result in gender wise distribution<sup>5,7</sup>. Joshi M, *et al* reported that Seizures were more common in age group of greater than 60 years<sup>9</sup>. In our study, we found that NOS were common in age group of 60-65 years resulting in 62% of cases.

Patients with the past medical history of Hypertension were significantly associated with unprovoked Seizures. In our study, 33% of study population had the past medical history of Hypertension and 62% of the study population had no personal habit of smoking and alcohol.

The most common type of Seizure in this study was focal to bilateral tonic-clonic Seizure (70%) followed by focal (18%) and generalized (12%), in contrast to a study done by Hart YM *et al*, where they concluded that focal seizures are the most common type<sup>10</sup>.

We observed that the major cause for Seizure was cerebrovascular accident which accounted for 40% in

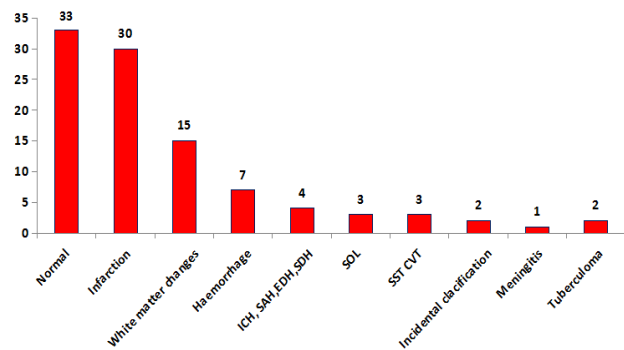


Fig 2 — Neuroimaging findings among NOS patients

Table 4 — Distribution according to etiology of seizures in elderly

Clinical Investigation	Age group			Total N (%)
	60-65 N (%)50	66-70 N (%)31	>70 N (%)19	
<b>Etiology :</b>				
Alcohol with drawl seizure	03 (06)	0	01 (5.2)	04
Cancer breast with cerebral METS	02 (04)	0	0	02
Cancer lungs with cerebral METS	0	0	01 (5.2)	01
Cerebral Vascular Accident+Haemorrhage	06 (12)	0	01 (5.2)	07
Cerebral Vascular Accident+Infarction	11 (22)	14 (45.1)	05 (26.3)	30
Cerebral Vascular Thrombosis	02 (04)	01 (3.2)	0	03
Hyperglycaemia Hyper osmolarity	06 (12)	02 (6.4)	03 (15.8)	11
Hypo Calcemia	0	01 (3.2)	0	01
Hypoglycaemia	03 (06)	03 (9.6)	0	06
Hyponatremia	0	01 (3.2)	0	01
Idiopathic	13 (26)	07 (22.5)	06 (31.5)	26
Meningitis	01 (02)	0	0	01
Traumatic brain injury	01 (02)	01 (3.2)	02 (10.5)	04
Uremic Encephalopathy	01 (02)	0	0	01
Tuberculoma	01 (02)	01 (3.2)	0	02

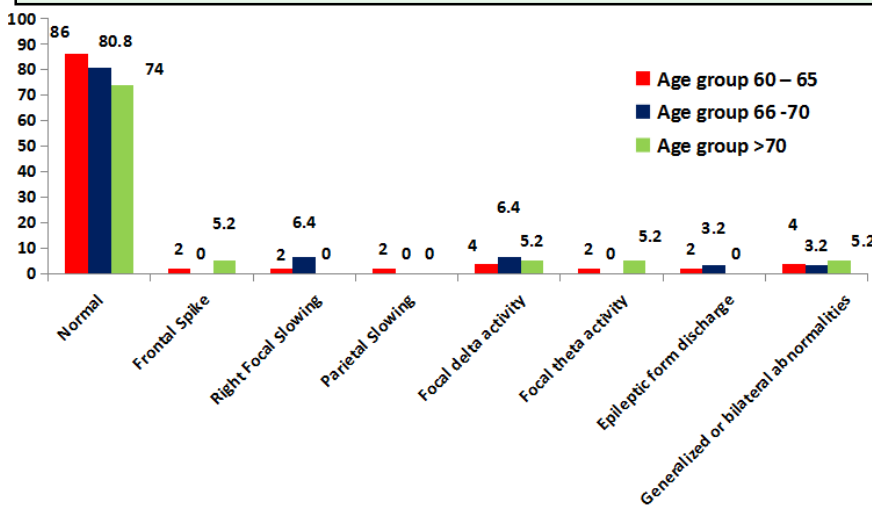


Fig 3 — EEG changes in seizure patients

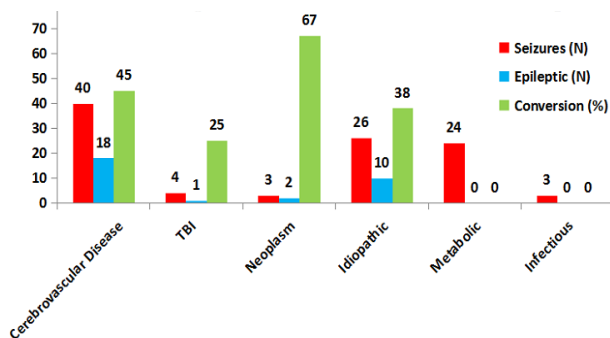


Fig 4 — Distribution of patients with New Onset of Seizure turning in to epilepsy

which ischemic stroke accounted for 30% of cases, 7% were hemorrhagic stroke and 3% were cerebral vascular thrombosis. This result is similar to Roberts MA, *et al*<sup>12</sup>.

Seizures are associated with alteration in metabolic homeostasis such as Hypoglycemia, Hyperglycemia, Hyponatremia and Hypocalcemia (13,14). We had 21% of cases with metabolic causes with 11% of hyperglycemic, 6% of Hypoglycemia and Hyponatremia and hypocalcemia accounted for 1% of cases.

Seizure is age dependent in developed countries. Among children, 20% are Symptomatic, 50% are Metabolic and 30% are Idiopathic. In Geriatrics, 55% are remote symptomatic and 45% are Idiopathic<sup>15</sup>. We reported that idiopathic cause is comparatively less (26%) and metabolic cause with 24%, whereas stroke occupies 40% when compared to the other studies<sup>15</sup>. This study showed that in 4% of the cases had TBI and 3% of the patients had Neoplasms and Infections.

In our study nearly 64% had abnormal Neuroimaging findings. Ischemic infarcts were the common finding (30%) followed by hemorrhage (7%). These finding are in concordant with study done by Kaur, *et al* in which 18% had ischemic infarcts and 8% had brain tumors<sup>5</sup>.

EEG abnormalities with intermittent focal slowing are commonly seen in older patients even without Seizure<sup>16</sup>. Our study is similar to other studies done by Drury, *et al*, which showed EEG was normal in majority of the patients with Seizure, irrespective of age<sup>17</sup>. 81% of patients had normal EEG, while abnormal EEG was found among 19%. Frontal spike, focal theta activity and epileptic form discharge were detected in 2% and 5% with focal delta activity. Right focal slowing (03%) and generalized or bilateral abnormalities (04%) were detected in marginal level.

We observed that NOS are common among the age of 60-65 years males. Cerebrovascular disease and Metabolic Diseases are the common etiology and

idiopathic Epilepsy is the predominant etiology among them.

### CONCLUSION

NOS among elderly patients are more prevalent in males with age group of 60-65 years. Stroke and the Metabolic Diseases are the major etiological profile for Seizure in geriatric population. Idiopathic Epilepsy is the predominant etiology among age of 60-65 years males.

**Prior Publication** – Nil

**Conflicts of Interest** – Nil

**Permissions** – Nil

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