

INVESTIGATION OF THE LEVELS OF GLUCOSE, ELECTROLYTES, UREA, AND IMAGING CHARACTERISTICS OF ELDERLY PATIENTS PRESENTING WITH ISOLATED SEIZURES

Chetna Patil¹, Kiran Kumar², Ujwal Zambare³, K Krishna Reddy⁴

¹Consultant Neurophysician and Assistant Professor, Bharati hospital and medical College, Pune, Maharashtra, India

²Yashoda hospital, Hyderabad, Telangana, India

³Medicover hospital, Pune, Maharashtra, India

⁴Consultant Neurophysician, Yashoda Hospital, Hyderabad, Telangana, India

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Corresponding Author:

Dr. Chetna Patil,
Email: drchetnapatil2@gmail.com

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Abstract

Background: To improve the diagnosis and treatment of isolated seizures in elderly patients, a comprehensive understanding of their clinical, etiological, laboratory, and imaging characteristics is crucial. This study aimed to investigate the levels of glucose, electrolytes, urea, and imaging characteristics in elderly patients presenting with isolated seizures. **Materials and Methods:** This research was conducted at Yashoda Super-specialty Hospital, Hyderabad, a medical facility that serves both urban and rural populations in the southern region of India. The study was a prospective one, taking place in the neurology department of the hospital between July 2017 and the end of December 2018. **Result:** In the current investigation, the average age of the research group was 72.48 ± 7.82 years. One-third (33.3%) of the participants were within the age range of 66 to 70 years, followed by 20.6% in the range of 76 to 80 years, and 19% in the range of 61 to 65 years. The analysis revealed that 68.3% of the patients were male, and 31.7% were female. The male-to-female ratio was 2.15:1. MRI showed normal findings in 38.1% cases, hemorrhage was observed in 4.8 %cases, small vessel ischemia was seen in 4.8% cases, meningeal enhancement was seen in 4.8% cases, CSVT was observed in 3.2% cases, infarct was observed in 1.6% cases. **Conclusion:** Our research on the imaging features and glucose, electrolyte, and urea levels of older patients with isolated seizures has provided new insights into this complex medical issue. Our findings reveal strong correlations between specific biochemical markers and imaging results, which may help explain some of the observed phenomena and their possible causes.

INTRODUCTION

Elderly patients are at a higher risk of experiencing seizures, which can negatively impact their quality of life.^[1-3] To improve the diagnosis and treatment of isolated seizures in elderly patients, it is crucial to have a comprehensive understanding of their clinical, etiological, laboratory, and imaging characteristics. Although previous research has identified several risk factors for seizures in this population, such as stroke, dementia, and infections, there is still limited knowledge about the specific characteristics of isolated seizures in elderly patients.^[2-5] This study tries address this knowledge gap by investigating the clinical, etiological, laboratory, and imaging characteristics of isolated seizures in elderly patients. Our primary objective is to explore these characteristics and hypothesize that there are unique features that can enhance the diagnosis and treatment

of this condition. Hence, the present study aimed to investigate the levels of glucose, electrolytes, urea, and imaging characteristics in elderly patients presenting with isolated seizures.

MATERIALS AND METHODS

This study was carried out at Yashoda Super-specialty Hospital, Hyderabad, a healthcare facility that serves both urban and rural populations in the southern part of India. The research was conducted in the neurology department of the hospital from July 2017 to the end of December 2018. The participants were elderly outpatients and inpatients who visited the neurology department of the hospital. To be eligible for the study, the patients had to be aged 60 or above and present with newly occurring seizures. Patients who had a history of seizure disorder prior to the study, were under the age of 60, had movement

disorders, hyperventilation syndrome, or had experienced a transient ischemic attack were not included in the study. Based on the inclusion and exclusion criteria, a total of 60 elderly patients were selected for the study. The plasma glucose levels of the participants were determined using the GOD-POD method, and their serum electrolytes were tested using flame photometry. All participants underwent MRI testing.

Statistical analysis:

SPSS was used to analyze data and calculate statistics, including mean, standard deviation (SD), range, frequencies, percentages, and chi-square test. The ANOVA test was used to evaluate the mean differences between three or more groups, and a p-value less than 0.05 was considered statistically significant.

RESULTS

In the current investigation, the average age of the research group was 72.48 ± 7.82 years. One-third

(33.3%) of the participants were within the age range of 66–70 years, followed by 20.6% in the range of 76–80 years, and 19% in the range of 61–65 years (Figure 1). The analysis revealed that 68.3% of the patients were male, and 31.7% were female. The male-to-female ratio was 2.15:1.

MRI showed normal findings in 38.1% of the cases, hemorrhage in 4.8%, small vessel ischemia was seen in 4.8% cases, meningeal enhancement was seen in 4.8% cases, CSVT in 3.2%, and infarct in 1.6% [Table 1].

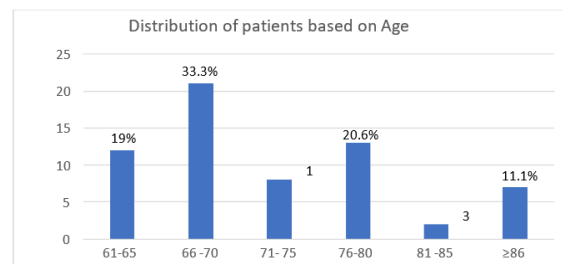


Figure 1: Distribution of study population based on age.

Table 1: Magnetic Resonance Imaging findings in the study population.

Parameter	Number of Patients	Percentage
Hyponatremia	12	46.15
Hashimoto Encephalopathy	2	7.69
Hyperglycemic	4	15.38
Hypoglycemic	4	15.38
Post Cardiac Arrest Hypoxic Encephalopathy	2	7.69
Uremic Encephalopathy	2	7.69
Total	26	100

Table 2: Metabolic etiology

Parameter	Frequency	Percentage
Normal	24	38.1
NCC	1	1.6
Secondary	2	3.2
CSVT	4	3.2
Infarct	1	1.6
Hemorrhage	3	4.8
Gliosis	1	1.6
Glioma	2	3.2
Small Vessel Ischemia	3	4.8
Meningeal Enhancement	3	4.8
Large Ring Enhancing Lesion	2	3.2
Meningioma	1	1.6
Hypoxic brain encephalopathy	1	1.6
Adem	1	1.6
Aneurysm Acom	1	1.6
Right Frontal Lymphoma	1	1.6

Table 3: Comparison between etiology and CT findings

CT Brain	Infection		metabolic		toxic		trauma		tumor		vascular		idiopathic		Alcoholic seizures	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Normal	5	15.2	13	39.4	2	6.1	0	0	0	0	3	9.1	6	18.2	4	12.1
Hemorrhage	0	0	0	0	0	0	1	20	0	0	4	80	0	0	0	0
Infarct	0	0	0	0	0	0	0	0	0	0	3	100	0	0	0	0
venous thrombosis	0	0	0	0	0	0	0	0	0	0	1	100	0	0	0	0
Tumor/SOL	0	0	0	0	0	0	0	0	6	100	0	0	0	0	0	0
ring enhancing lesion	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
senile atrophy	0	0	0	0	0	0	0	0	0	0	0	0	1	100	0	0
Gliosis	0	0	0	0	0	0	2	20	0	0	8	80	0	0	0	0
Tuberculoma	2	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NCC	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	9	14.3	13	20.6	2	3.2	3	4.8	6	9.5	19	30.2	7	11.1	4	6.3

DISCUSSION

This research aimed to address a gap in knowledge by investigating the clinical, etiological, laboratory, and imaging characteristics of isolated seizures in elderly patients. Our main objective was to explore these characteristics and hypothesize that there are unique features that can enhance the diagnosis and treatment of this condition.

In this study, seizures were most frequently observed in the age group of 66-70 years (33.3%), followed by the age group of 76-80 years (20.6%), which is comparable to previous studies,^[6] (38.1% in the 65-70 years age group) and Sarmah et al,^[7] (34.9% in the 66-70 years age group, 19% in the 61-65 years age group). The mean age of the study group in the present study was 72.48 ± 7.82 years. In this study, the patients were predominantly males (68.3%), similar to other studies, such as Sarmah et al,^[7] and Tanaka et al.^[8] In this study, 68.3% of patients were males, and 31.7% were females, with a male-to-female ratio of 2.15:1.

Hyperglycemia (15.38%), hypoglycemia (15.38%), and uremia (7.6%) were the most prevalent metabolic causes, with hyponatremia accounting for 38.46% of the cases. Cases attributable to hyponatremia and hypoglycemia predominated in this depiction, which is comparable to other studies by,^[6] and Sarmah et al.^[7] However, the absence of hepatic encephalopathy, hypocalcemia, and hypomagnesemia, which were identified in previous studies, was a notable difference in this study. Additionally, a few cases of hyperglycemia-associated seizures were observed in our study, demonstrating that both hypoglycemia and hyperglycemia are harmful to the brain. Myoclonic movements were present in 7.7% of the patients with metabolic seizures, while focal seizures accounted for 7.7% (GTCS). Patients taking oral hypoglycemic agents and alcoholics exhibit symptoms of hypoglycemia. In elderly patients, hyponatremia was associated with an altered sensorium but no focal deficit. Similar to the findings of Sarmah et al,^[7] serum analyses in patients with newly diagnosed seizures, normal physical examinations, and the absence of comorbidities yielded low-yielding results, excluding serum glucose. Therefore, electrolyte levels in patients with abnormal physical examination findings and comorbidities should be determined in addition to glucose levels in all patients.

To exclude cases that required immediate intervention, emergency CT brain scans were performed on all patients, given that the majority of cases in this study were admitted on an emergent basis. In total, 47.6% of the cases were deemed anomalous. This finding was comparable to that of Binod et al.^[119], in which 61.7% of the participants exhibited abnormal CT findings. In the overall cohort

of the present study, 52.4% of the patients had normal findings and on the other hand, 68.1% of patients displaying aberrant examination of CT scan findings. The predominant irregularities observed on the CT brain scans were hemorrhage (7.9%), gliosis (15.9%), and space-occupying lesions (9.5%). Moreover, a history of tuberculosis, HIV infection, and fever was also identified as a noteworthy predictor of abnormal CT scans. Although most of the identified lesions were amenable to treatment, the subdural hemorrhage and the tumor necessitated immediate attention. While the majority of lesions are discovered through CT scanning, certain cases require MRI for an accurate diagnosis. This suggests that CT scans should be performed in emergency situations as they can detect neurological lesions and lead to further treatment. Nevertheless, normal mental status and neurological examinations do not guarantee that an individual does not have a significant intracranial lesion. Only 51 patients underwent MRI examinations for diverse reasons, including clinical stability and, in some cases, evident causes supported by other basic investigations and a CT scan. According to the data, 38.1 percent of cases involved the detection of infarct through MRI, 4.8 percent of cases revealed small vessel ischemia, and 4.8 percent identified meningeal enhancement. Additionally, 3.2 percent of the cases indicated the presence of CSVT, and 1.6 percent of the cases showed evidence of infarction. In a comparable study by,^[7] 59.7% of the study patients showed abnormal MRI findings.

CONCLUSION

Our research on the imaging features and glucose, electrolyte, and urea levels of older patients with isolated seizures has provided new insights into this complex medical issue. Our findings reveal strong correlations between specific biochemical markers and imaging results, which may help explain some of the observed phenomena and their possible causes. Healthcare providers can enhance diagnostic accuracy and population management skills by incorporating these factors into the diagnostic process. Our study also demonstrates that further research is needed to establish precise connections between biochemical abnormalities, imaging results, and clinical outcomes in older individuals with isolated seizures. Improved patient care and outcomes for this vulnerable group may result from continued investigation in this area, leading to the development of more targeted and specialized treatment strategies.

REFERENCES

1. Shih T, Schmader KE. Seizures and epilepsy in older adults: Etiology, clinical presentation, and diagnosis. Waltham, MA: UpToDate. 2022.
2. Mahmoud MH, Awad EM, Mohamed AK, Shafik MA. Etiological profile of new-onset seizures among adult Egyptians. *The Egyptian Journal of Neurology, Psychiatry and Neurosurgery*. 2021 December;57:1-8.
3. Bhatia MS, Sharda SC, Yadav G, Mehta S, Attri R, Singla N. Etiology of new-onset seizures in adult patients of different age groups presenting to the emergency department in North India and their outcomes. *Journal of Family Medicine and Primary Care*. 2022 November 1;11(11):7129-35.
4. Hickman LB, Stern JM, Silverman DH, Salamon N, Vossel K. Clinical, imaging, and biomarker evidence of amyloid-and tau-related neurodegeneration in late-onset epilepsy of unknown etiology. *Frontiers in Neurology*. 2023 September 27;14:1241638.
5. Manfredonia F, Saturno E, Lawley A, Gasverde S, Cavanna AE. Prevalence and clinical correlates of non-convulsive status epilepticus in elderly patients with acute confusional state: A systematic literature review. *Journal of the Neurological sciences*. 2020 March 15;410:116674.
6. Pandey RP. A Study of Clinical Profile of Seizure Disorder in Geriatric Population. *Xholars Journal of Applied Medical Sciences (SJAMS)*. 2017;5:237-.
7. Sarmah B, Kharbanda PS, Prabhakar S. Seizures and epilepsy in elderly: a tertiary care centrehospital based study. *Journal of Evolution of Medical and Dental Sciences*. 2015 November 19;4(93):15880-5.
8. Tanaka A, Akamatsu N, Shouzaki T, Toyota T, Yamano M, Nakagawa M, Tsuji S. Clinical characteristics and treatment responses in new-onset epilepsy in the elderly. *Seizure*. 2013 November 1;22(9):772-5.