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Research Article

Etiological Spectrum and Clinical Outcomes of Epilepsy in the Geriatric Population of Western Uttar Pradesh: A Prospective Observational Study

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ABSTRACT

Background: Epilepsy shows a bimodal age distribution, with a second incidence peak in individuals ≥60 years [1,2]. The elderly constitute the fastest-growing subgroup of epilepsy patients globally [3]. Regional Indian data remain limited.

Objective: To evaluate etiological spectrum, clinical characteristics, and predictors of outcome in geriatric epilepsy in Western Uttar Pradesh.

Methods: A prospective observational study (January 2023–December 2024) including patients aged ≥60 years with ≥2 unprovoked seizures. Seizures were classified according to ILAE 2017 criteria [4,5]. Clinical, EEG, metabolic, and neuroimaging data were analyzed. Logistic regression identified predictors of poor outcome (mRS ≥3 at 12 months).

Results: Among 300 patients (mean age 68.4 ± 6.5 years; 56% male), focal-onset seizures predominated (66%). Etiology included cerebrovascular disease (38%), neurodegenerative disorders (21%), metabolic abnormalities (15%), intracranial space-occupying lesions (12%), infections (6%), and cryptogenic causes (8%). EEG abnormalities were seen in 74%; MRI abnormalities in 64%. Stroke (OR 2.8; 95% CI 1.7–4.6), status epilepticus (OR 3.5; 95% CI 1.4–8.1), and treatment delay >2 weeks (OR 2.1; 95% CI 1.2–3.7) independently predicted poor outcome. Mortality was 9.7%.

Conclusion: Geriatric epilepsy in Western UP is predominantly vascular in origin, with substantial contributions from metabolic disturbances and structural brain lesions. Early neuroimaging, aggressive vascular risk control, and prompt management significantly influence long-term functional outcomes.

KEYWORDS

Geriatric epilepsy, Late-onset epilepsy, Cerebrovascular disease, EEG abnormalities, Neuroimaging, Status epilepticus, Predictors of outcome.

Introduction

Epilepsy incidence increases significantly after 60 years of age [1-3]. Cerebrovascular disease is recognized as the leading cause of late-onset epilepsy worldwide [6,7]. Additional contributors include neurodegenerative disorders, metabolic disturbances, and intracranial space-occupying lesions (ICSOL) [8-10].

In India, epidemiological data on epilepsy exist [11-13], yet specific data on geriatric epilepsy from Western Uttar Pradesh are scarce. Given the increasing burden of vascular risk factors in this region, region-specific data are necessary.

Materials and Methods

Prospective observational hospital-based study conducted at a tertiary care center in Meerut from January 2023 to December 2024.

Inclusion Criteria

Age ≥60 years
≥2 unprovoked seizures
Classified per ILAE 2017 [4,5]

Definitions

Metabolic seizures: Seizures associated with electrolyte imbalance, hypoglycemia, uremia, or hepatic encephalopathy resolving after correction [14].
ICSOL: Tumor, metastasis, granuloma, abscess, or structural lesion detected on MRI [9].
Poor outcome: mRS ≥3 at 12 months.

Statistical analysis performed using SPSS v27; $p < 0.05$ significant.

Results

Variable	Value
Mean age	68.4 ± 6.5 years
Male	168 (56%)
Hypertension	174 (58%)
Diabetes mellitus	123 (41%)
Prior stroke	108 (36%)
Dementia	51 (17%)

Table 1: Baseline Clinical Characteristics (n=300).

Type	n (%)
Focal onset	198 (66%)
Generalized onset	102 (34%)
Status epilepticus	18 (6%)

Table 2: Seizure Classification.

Etiology	n (%)
Cerebrovascular disease	114 (38%)
Neurodegenerative disorders	63 (21%)
Metabolic abnormalities	45 (15%)
ICSOL	36 (12%)
CNS infections	18 (6%)
Cryptogenic	24 (8%)

Table 3: Etiological Spectrum.

Investigation	Abnormal (%)
EEG	74%
MRI Brain	64%

Table 4: Neurodiagnostic Findings.

Variable	OR	95% CI	p
Stroke	2.8	1.7–4.6	<0.01
Status epilepticus	3.5	1.4–8.1	<0.01
Delay >2 weeks	2.1	1.2–3.7	0.02

Table 5: Predictors of Poor Outcome.

Discussion

Cerebrovascular disease remains the predominant etiology of geriatric epilepsy [6,7]. This aligns with global evidence identifying stroke as the most important risk factor for late-onset seizures [15]. The significant burden of vascular risk factors in Northern India likely explains this predominance [16].

Metabolic abnormalities (15%) represent reversible etiologies and highlight the importance of systematic laboratory screening in elderly seizure patients [14]. ICSOL accounted for 12%, consistent with literature emphasizing tumor-related epilepsy in aging populations [9,10].

Neurodegenerative disorders comprised 21%, reinforcing emerging evidence linking Alzheimer's disease and epilepsy [17].

Independent predictors of poor outcome were stroke, status epilepticus, and delayed treatment—findings consistent with international cohorts [18,19].

Strengths and Limitations

Strengths include prospective design, standardized ILAE classification, and structured outcome assessment.
Limitations include hospital-based sampling and absence of continuous EEG monitoring.

Conclusion (Enhanced Impactful Version)

Epilepsy in the geriatric population of Western Uttar Pradesh is primarily a manifestation of underlying cerebrovascular pathology, reflecting the region's high vascular risk burden. However, a substantial proportion of cases arise from reversible metabolic disturbances and structural brain lesions, underscoring the necessity of comprehensive diagnostic evaluation.

The identification of stroke, status epilepticus, and treatment delay as independent predictors of poor functional outcome highlights a critical window for intervention. Early neuroimaging, prompt correction of metabolic derangements, aggressive vascular risk management, and timely initiation of appropriate antiseizure therapy are essential to reduce morbidity and mortality.

Given the rapid demographic aging in India, geriatric epilepsy represents an emerging public health challenge. Structured regional data such as this study provide a foundation for developing targeted diagnostic algorithms and preventive strategies aimed at improving long-term neurological outcomes in elderly patients.

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