Research Article

Post-stroke epilepsy in Oman: Prevalence, clinical profile, and treatment outcomes

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ABSTRACT

Introduction: Post-stroke epilepsy (PSE), defined as unprovoked seizures occurring more than seven days after stroke onset, is a frequent neurological complication with variable incidence and outcomes. This study estimated the prevalence of PSE among acute stroke patients, described its types, assessed treatment adherence, and outcomes.

Method: A retrospective analysis was conducted on acute stroke patients diagnosed with PSE at Sohar Hospital from January 2023 to December 2024.

Results: PSE was identified in 7.3% of acute stroke patients. Haemorrhagic stroke accounted for 86.7% of cases, while ischaemic stroke represented 13.3%. Generalised seizures were most common (63.3%), followed by focal seizures (26.7%); 10.0% remained unclassified. All patients were treated with antiseizure medication (ASM) monotherapy—levetiracetam (90%) or carbamazepine (10%). Overall adherence to ASM was 96.7%, with no significant difference between levetiracetam and carbamazepine (p = 0.07). Seizure control was achieved in 90.0% of patients, partial control in 10.0%, and no patients had poor control. Levetiracetam achieved higher control rates than carbamazepine (96.3% vs. 33.3%, p = 0.0006). Gender was not significantly associated with seizure control (p = 0.238).

Conclusion: PSE in this study mainly followed haemorrhagic stroke and presented mainly with generalised seizures. Monotherapy with levetiracetam was associated with better seizure control, but due to the small sample size, a larger study is needed to draw firmer conclusions.

Keywords: post-stroke epilepsy, levetiracetam, carbamazepine, seizure control, Oman.

Introduction

Post-stroke epilepsy (PSE) is defined as unprovoked seizures occurring more than seven days after stroke onset and is a common neurological complication of both ischaemic and haemorrhagic strokes.[1] Large stroke, cortical involvement, haemorrhagic stroke or haemorrhagic transformation, and early seizures are predictors of post-stroke epilepsy.[2]

The incidence of early seizures (within seven days of stroke) ranges from 2% to 7%, while late seizures, which define PSE, occur in approximately 2–4% of stroke survivors within the first few years.[3] A pooled meta-analysis showed a cumulative incidence of 10% for late seizures.[4] Notably, haemorrhagic strokes pose a significantly higher risk than ischaemic ones. However, some studies showed a higher incidence among ischaemic strokes.[5]

PSE accounts for 30–50% of new-onset epilepsy in older adults, making it the most common cause of epilepsy in individuals over 60 years.[6] The majority of seizures after stroke are focal-onset, especially in cortical strokes, and may secondarily generalise.[7] Generalized-onset seizures and non-convulsive status epilepticus occur less frequently but are associated with worse outcomes.[8] In a Saudi study involving 1,235 stroke patients, post-stroke epilepsy occurred in 13.5%.[9]

The mainstay of treatment is monotherapy with antiseizure medications. Levetiracetam, valproate, and carbamazepine are commonly used.[10] Levetiracetam is favoured for its favourable side effect profile, particularly in the elderly. In a recent controlled trial conducted in the USA, about 55% of patients started on levetiracetam; 12% required polytherapy over time. Newer antiseizure medications such as perampanel improved seizure control with acceptable tolerability in patients with PSE.[11]

Seizure control is generally achievable in most PSE patients with appropriate treatment. However, older age, status epilepticus, and non-convulsive status epilepticus are associated with poor prognosis and increased mortality.[7] A large cohort study found that PSE patients have a higher risk of death and cognitive decline compared to stroke patients without epilepsy.[12]

Older adults are more likely to develop PSE and to have poorer seizure control, likely due to comorbidities and reduced antiseizure medication tolerability.[3] While male gender has been identified as a modest risk factor for post-stroke seizures, it has no consistent influence on treatment compliance or seizure control.[10]

In this study, we aimed to estimate the prevalence of PSE, its types, its control, and identify seizure control predictors.

Method

We conducted a retrospective study at Sohar Teaching Hospital in Sohar, North Al Batinah Governorate, Oman, in the Department of Medicine, Stroke Unit.

Admitted Omani stroke patients aged ≥18 years, who developed PSE at Sohar Hospital between January 2023 and December 2024. The study excluded those with a known epilepsy prior to the stroke, those with a history of significant head trauma, a neurosurgical intervention, and patients with chronic brain disorders.

A total coverage method was employed, involving all eligible adult stroke patients during the study period, the sampling unit being individual patients diagnosed with PSE.

Potential participants were identified through authorised access to the electronic medical records (EMR) of Sohar Hospital. In cases requiring supplementary information, the Co-Principal Investigator facilitated patient contact.

Data were collected from the EMRs using a pre-designed structured questionnaire.

Ethical approvals were obtained from the bioethics and safety committee of the College of Medicine, National University of Science and Technology, the Ministry of Health Ethical Committee, and the institutional review board at Sohar Hospital.

Descriptive statistics were used to describe the sample and calculate prevalence. Inferential statistics included correlation tests for continuous variables. Chi-square and Fisher's exact test were used for categorical data associations. A level of $p < 0.05$ was considered statistically significant. Data were analysed using IBM SPSS Statistics software.

All data collection forms were complete, with no missing information.

Results

Demographic and clinical characteristics

Table 1 presents the baseline demographic and clinical characteristics of the participants. Of 411 patients screened, 30 patients who developed post-stroke epilepsy were enrolled in this study, resulting in a prevalence of 7.3%. The median age was 55.5 years (Range = 18-83). The types of strokes leading to PSE were as follows: 26 (86.7%) of PSE cases occurred in haemorrhagic strokes, and four (13.3%) in ischaemic strokes. In terms of seizure classification, generalised seizures were the most frequently observed, affecting 63.3% of patients (n=19). Focal seizures occurred in 26.7% (n=8), while 10.0% (n=3) of cases remained unclassified. Early onset of seizures was detected in 17(56.7%) and late onset in 13 (43%)

Table 1. Demographic and clinical characteristics of post-stroke epilepsy cases

Characteristics	n (%)
Age group (years)	
< 40	8 (26.7)
40-49	2 (6.6)
50-59	5 (6.6)
60-69	6 (20.0)
≥ 70	9 (30.0)
Sex	
Male	14 (46.7)
Female	16 (53.3)
Risk of Stroke	
Hypertension	20 (66.7)
Diabetes mellitus	10 (33.3)
Cardiac disease	9 (30.0)
Types of strokes	
Haemorrhagic	26 (86.7)
Ischaemic	4 (13.3)
Types of PSE	
Generalised	19 (63.3)
Focal	8 (26.7)
Unclassified	3 (26.7)
Onset of stroke	
Early	17 (56.7)
Late	13 (43)
Size of hemispheric ischaemic stroke	
Large	2 (50) out of ischaemic stroke
Small to moderate	2 (50) out of ischaemic stroke

Table 2. Type treatment, mode of therapy, adherence to treatment among the studied patients

Parameter	n (%)
ASM choice	
Levetiracetam	27 (90.0)
Carbamazepine	3 (10.0)
Mode of therapy	
Monotherapy	30 (100.0)
Polytherapy	0 (0.0)
Adherence to treatment	
Adherent	29 (96.7)
Not adherent	1 (3.3)
Seizure Control	
Well controlled	27 (90.0)
Partially controlled	3 (10.0)
Poorly controlled	0 (0.0)

Antiseizure medication (ASM) choice and mode of therapy

Levetiracetam was the choice for 27(90%) patients and carbamazepine for three (10%) patients. The details of ASM employed in this group of patients is shown in Table 2.

Patient adherence to ASM

Most (96.7%, 29 of 30) adhered to their ASM. Adherence to carbamazepine was 100% (3/3) compared to 96.3% (26 of 27) adherence to levetiracetam. There was no significant difference between the groups in terms of adherence to treatment (p= 0.07)

Seizure control among patients

Seizures were well controlled in 90.0% (n=27) of patients on monotherapy, partially controlled in 10.0% (n=3), and none were poorly controlled. In the levetiracetam group, 96.3% (26 of 27) were well controlled, and 5.7% (1/27) were partially controlled. In the carbamazepine group, 33.3% (1 of 3) were well controlled, and 66.3% (2 of 3) were partially controlled. Seizure control was better with levetiracetam (p-value of 0.0006).

Discussion

In this study, the prevalence of PSE was 7.3%, which lies within the reported range of late seizures following stroke, though it is slightly lower than the 10% pooled incidence found in a previous meta-analysis.[5]

The predominance of PSE following haemorrhagic stroke (86.7%) compared with ischaemic stroke (13.3%) is consistent with prior studies highlighting the higher epileptogenic potential of haemorrhagic lesions.[2,4] This finding also aligns with earlier reports from the region, such as the Saudi cohort, in which haemorrhagic stroke was a major contributor to post-stroke seizures.[11]

Generalised seizures were the most common presentation in our cohort (63.3%), exceeding the proportion of focal-onset seizures (26.7%). This distribution contrasts with prior literature indicating focal seizures as the dominant type in PSE[9] The higher proportion of generalised seizures in our sample may reflect differences in stroke subtype distribution, lesion location, or seizure classification limitations due to incomplete documentation in some cases.

Levetiracetam was prescribed in 90% of cases. The preference for levetiracetam mirrors patterns seen in European and North American cohorts,[13] likely due to its favourable tolerability profile in older adults.

The higher prevalence of PSE among haemorrhagic stroke patients underscores the importance of targeted seizure surveillance and early ASM initiation in this subgroup.[2,4]

Overall, our findings contribute new data on the prevalence and clinical characteristics of PSE in Oman. Future studies with larger numbers are warranted to confirm these results, identify additional prognostic factors, and explore the potential role of newer ASMs.

Conclusion

PSE in this study predominantly followed haemorrhagic stroke and presented mainly with generalised seizures. Monotherapy with levetiracetam was associated with high adherence and seizure control. These findings highlight the need for vigilant seizure monitoring in haemorrhagic stroke survivors and support the preferential use of levetiracetam in PSE management in similar settings, but due to the small sample size, a larger study is needed to draw firmer conclusions.

Availability of data: The datasets used are available from the corresponding author upon reasonable request.

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Conflict of interests: None

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