



## A Comprehensive Clinical Review of Epilepsy and Seizure Disorders: Diagnostic, Therapeutic, and Epidemiological Perspectives

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### Abstract

Epilepsy is one of the most prevalent neurological disorders globally, characterized by recurrent unprovoked seizures resulting from abnormal neuronal discharges. This study reviews recent clinical evidence on the etiology, diagnosis, classification, and treatment approaches for epilepsy and seizure disorders. Emphasis is placed on the differentiation between epileptic and non-epileptic seizures, the utility of imaging and electroencephalographic tools, and the pharmacological management tailored to seizure type and patient profile. Furthermore, this paper explores epidemiological trends, treatment gaps, and the socio-psychological impacts of epilepsy, especially in low-income regions. Findings underline the need for early diagnosis, patient-centered therapeutic planning, and integrated public health strategies.

**Keywords:** epilepsy, seizure disorders, antiepileptic drugs, EEG, temporal lobe epilepsy, neuroimaging, refractory epilepsy, seizure classification, public health neurology

### Introduction

Epilepsy is a chronic neurological condition marked by a predisposition to generate epileptic seizures, affecting approximately 50 million individuals worldwide. It encompasses a range of syndromes and etiologies, from genetic to acquired causes such as head trauma, infections, and stroke. Seizures may vary from brief lapses in attention to prolonged convulsions, depending on the type and origin

of abnormal neural activity.

Classification systems, including the ILAE 2017 framework, offer essential guidelines to identify seizure types and epileptic syndromes, aiding in diagnosis and management. Despite advances in medical science, a substantial number of patients remain undiagnosed or undertreated, especially in developing countries.

Understanding the multifactorial nature of epilepsy is crucial for developing effective diagnostic, therapeutic, and preventive strategies.

### Material and Methods

This study utilized a mixed-methods approach consisting of:

- **Literature Review:** Comprehensive search of peer-reviewed journals in PubMed, Scopus, and Web of Science using terms such as “epilepsy”, “seizure types”, “anticonvulsants”, and “neuroimaging in epilepsy”.
- **Inclusion Criteria:** Studies published between 2010 and 2024 in English, involving human subjects, with a focus on diagnosis, treatment, and epidemiology.
- **Exclusion Criteria:** Case reports, editorials, and non-clinical studies were excluded.
- **Data Extraction:** Key themes included seizure classification, treatment outcomes, epidemiology, and health policy considerations.

In addition, anonymized secondary data from three tertiary neurology clinics (Europe, Asia, and Africa) were used to observe trends in diagnosis and treatment adherence over a 5-year period (2018–2023).

### Results

The review and observational data highlighted several critical findings:

1. **Seizure Classification:** Focal seizures remained the most commonly diagnosed type across all regions, with temporal lobe epilepsy being the dominant subtype. Generalized tonic-clonic seizures were more frequently reported in younger populations.
2. **Diagnosis:** Electroencephalogram (EEG) remained the primary diagnostic tool, with MRI showing utility in structural lesion detection. In rural clinics, access to advanced imaging was limited.
3. **Treatment Patterns:** Sodium valproate, carbamazepine, and levetiracetam were the most commonly prescribed antiepileptic drugs (AEDs). Approximately 25% of patients

### References

1. World Health Organization. (2019). *Epilepsy: A public health imperative*. Geneva: WHO.

demonstrated drug resistance, aligning with global prevalence of refractory epilepsy.

4. **Epidemiological Trends:** The prevalence of epilepsy was highest in low-income settings, where diagnostic delays and treatment gaps were significant. The average time from first seizure to diagnosis ranged from 9 to 18 months in low-resource settings.
5. **Psychosocial Impact:** Stigma, educational exclusion, and employment challenges were consistently reported in qualitative studies, particularly among female patients.

### Discussion

The results underscore the heterogeneity of epilepsy and the importance of personalized treatment approaches. The ILAE’s emphasis on classification based on onset, awareness, and motor/non-motor features helps clinicians better tailor interventions.

Despite therapeutic advancements, drug-resistant epilepsy continues to affect nearly a quarter of patients, calling for research into novel AEDs, surgical interventions, and neuromodulation techniques. Lifestyle factors, adherence, and genetic predispositions contribute to treatment outcomes and must be addressed holistically.

Public health disparities remain a significant barrier. In low-income countries, epilepsy is often untreated due to lack of resources, myths, and inadequate healthcare infrastructure. This "treatment gap" exacerbates preventable disability and economic loss.

Psychosocial impacts cannot be overlooked. Depression, anxiety, and social stigma affect quality of life and should be routinely screened for in epilepsy management.

### Conclusion

Epilepsy and seizure disorders present diverse clinical and public health challenges. Effective diagnosis and management require a multifaceted approach that includes clinical precision, patient education, access to AEDs, and psychosocial support. Bridging the treatment gap in underserved populations should be a global health priority. Further research into non-pharmacological treatments, predictive biomarkers, and cultural perceptions of epilepsy is also essential.

2. Fisher, R. S., et al. (2017). Operational classification of seizure types by the International League Against Epilepsy. *Epilepsia*, 58(4), 522–530.

3. Perucca, E., & Tomson, T. (2011). The pharmacological treatment of epilepsy in adults. *The Lancet Neurology*, 10(5), 446–456.
4. Kwan, P., Arzimanoglou, A., Berg, A. T., et al. (2010). Definition of drug resistant epilepsy: Consensus proposal by the ad hoc Task Force of the ILAE. *Epilepsia*, 51(6), 1069–1077.
5. Singh, G., & Sander, J. W. (2020). The global burden of epilepsy. *Epilepsy & Behavior*, 105, 106946.
6. Sillanpää, M., & Schmidt, D. (2012). Natural history of treated childhood-onset epilepsy: Prospective, long-term population-based study. *Brain*, 135(9), 2887–2899.
7. Ngugi, A. K., Bottomley, C., Kleinschmidt, I., Sander, J. W., & Newton, C. R. (2010). Estimation of the burden of active and life-time epilepsy: A meta-analytic approach. *Epilepsia*, 51(5), 883–890.
8. Brodie, M. J., & Kwan, P. (2002). Staged approach to epilepsy management. *Neurology*, 58(8), S2–S8.
9. Löscher, W., & Schmidt, D. (2011). Modern antiepileptic drug development has failed to deliver: Ways out of the current dilemma. *Epilepsia*, 52(4), 657–678.
10. Baker, G. A. (2002). The psychosocial burden of epilepsy. *Epilepsia*, 43(S6), 26–30.



