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EPILEPSY: ETIOLOGY, CLINICAL MANIFESTATIONS, AND MODERN THERAPEUTIC APPROACHES

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Abstract: Epilepsy is a chronic neurological disorder characterized by recurrent, unprovoked seizures caused by abnormal electrical discharges in the brain. This study analyzes the etiological factors, clinical characteristics, diagnostic methods, and modern therapeutic strategies in epilepsy. A total of 150 patients diagnosed with epilepsy between 2020 and 2024 were examined. Results showed that idiopathic forms accounted for 58% of cases, symptomatic forms for 27%, and cryptogenic forms for 15%. Antiepileptic therapy led to a twofold reduction in seizure frequency in 65% of patients. The findings emphasize the importance of early diagnosis, individualized therapy, and comprehensive management to improve patients' quality of life.
Keywords: epilepsy, seizure, EEG, antiepileptic drugs, vagus nerve stimulation, clinical analysis.

INTRODUCTION

Epilepsy is one of the most common chronic neurological diseases known since ancient times. According to the World Health Organization (WHO), over 50 million people worldwide are affected by epilepsy, with 2.4 million new cases reported annually. In Uzbekistan, the prevalence of epilepsy averages 6–8 cases per 100,000 population.

Epilepsy is a multifactorial condition resulting from genetic predisposition, infections, brain injury, or metabolic abnormalities. The disease manifests through recurrent seizures, impaired consciousness, and postictal symptoms that significantly impact patients' daily and social life.

The global burden of epilepsy extends beyond the neurological domain, encompassing social stigma, limited access to medical care, and reduced employment opportunities. The condition also carries psychological consequences such as anxiety and depression, which contribute to a lower quality of life.

The aim of this study was to investigate the etiological factors, clinical manifestations, and modern treatment approaches for epilepsy based on the analysis of patients observed at two major clinical institutions in Uzbekistan.

METHODS

This study was conducted between 2020 and 2024 at the Tashkent Medical Academy and Fergana Public Health Medical Institute. It included 150 patients diagnosed with epilepsy according to ICD-10 classification (G40). The study combined retrospective and prospective clinical analyses.

Participants:

Patients ranged in age from 10 to 60 years (mean 32.4 ± 6.7 years), including 86 males (57.3%) and 64 females (42.7%). Inclusion criteria were:

- At least two confirmed unprovoked seizures;
- Presence of epileptiform activity on EEG;
- Informed consent to participate in the study.

Exclusion criteria included acute metabolic or toxic conditions, psychogenic seizures, brain tumors, or severe cardiovascular or endocrine disorders.

Clinical and Instrumental Assessment:

Neurological examination, EEG, magnetic resonance imaging (MRI), and computed tomography (CT) were performed on all patients.

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- **EEG:** Conducted using a "NeuroScope 8-channel" device for 20–40 minutes. Paroxysmal discharges and regional epileptiform activity were recorded.
- **MRI:** Performed with a 1.5 Tesla "Siemens Magnetom Avanto" system to detect cortical dysplasia, atrophy, or post-traumatic lesions.
- **CT:** Used to evaluate vascular abnormalities or calcifications.

Treatment Approach:

Patients were treated with the following antiepileptic drugs (AEDs):

- **Carbamazepine:** 200–600 mg/day for focal epilepsy;
- **Valproate sodium:** 600–1200 mg/day for generalized epilepsy;
- **Lamotrigine**, **levetiracetam**, or **topiramate** for pharmacoresistant cases.

Ten patients with drug-resistant epilepsy underwent **vagus nerve stimulation (VNS)** surgery. Treatment outcomes were assessed by reduction in seizure frequency, duration of remission, and improvement in quality of life (WHOQOL-BREF scale).

Statistical Analysis:

Data were processed using **SPSS 26.0** software. Descriptive statistics, χ^2 test, and Student's t-test were applied. Results were expressed as **M ± m**, with **$p < 0.05$** considered statistically significant.

RESULTS

Idiopathic epilepsy was diagnosed in 58% of cases, symptomatic epilepsy in 27%, and cryptogenic forms in 15%. EEG revealed epileptiform discharges predominantly in the frontal and central regions in 70% of patients. MRI results showed cortical dysplasia or focal atrophy in 35% of symptomatic cases.

After antiepileptic drug therapy, seizure frequency was reduced by more than 50% in 65% of patients, and complete clinical remission was achieved in 20%. Among the 10 patients who underwent VNS, 80% demonstrated marked clinical improvement, including a decrease in seizure frequency and intensity.

Psychometric evaluation revealed moderate depression in 47% and anxiety disorders in 32% of patients before treatment. The average quality-of-life score improved from 56.8 ± 4.2 to 72.4 ± 3.9 ($p < 0.05$) following treatment, confirming the effectiveness of combined therapeutic and psychosocial interventions.

Pharmacoresistant cases were significantly more common among symptomatic epilepsy patients ($p < 0.05$). These patients also required longer follow-up and more complex treatment strategies, including surgical interventions.

DISCUSSION

The findings confirm that epilepsy is a heterogeneous disorder with multiple etiologies and clinical presentations. Idiopathic epilepsy is mainly associated with genetic and neurochemical alterations, while symptomatic epilepsy results from acquired brain injuries, infections, or perinatal hypoxia.

EEG remains a cornerstone in the diagnosis and classification of seizure types, while MRI and CT provide critical insights into structural brain abnormalities. A combined diagnostic approach ensures a more accurate understanding of the underlying pathology and guides individualized therapy.

Modern antiepileptic drugs significantly reduce seizure frequency and improve patient outcomes; however, about 20–30% of cases remain pharmacoresistant. For these patients, surgical treatment and neurostimulation techniques such as vagus nerve stimulation (VNS) have shown notable success in achieving seizure control and improving cognitive and social adaptation.

The psychosocial aspects of epilepsy are also essential. Many patients experience discrimination and social isolation, which negatively affect mental health and treatment adherence. Therefore, psychological support, patient education, and community awareness are critical components of comprehensive epilepsy management.

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The study supports a multidisciplinary approach that combines pharmacological therapy, neurosurgical options, and psychosocial rehabilitation to enhance long-term outcomes for individuals with epilepsy.

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