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Determination of Seizure Recurrence Frequency and Factors Increasing the Risk of Seizure Recurrence in Patients Presenting with a First and Single Seizure

İlk ve Tek Nöbet ile Başvuran Hastalarda Nöbet Tekrar Sıklığının Saptanması ve Nöbet Tekrar Riskini Artıran Faktörlerin Belirlenmesi

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ABSTRACT

Aim: Approximately 10% of the population experiences a seizure at some point in their lives. However, the prevalence of epilepsy in the general population is around 3%. It is important to predict which individuals presenting with a first-time seizure are at high risk of recurrence and who should be started on antiepileptic medication.

Materials and Methods: This study included 140 patients over the age of 18 who presented to the emergency department or Neurology outpatient clinic for the first time with a complaint of fainting, starting from January 2022. Demographic characteristics, neurological examination findings, electroencephalography (EEG), and brain magnetic resonance imaging (MRI) data were obtained from the hospital information system. Patients were contacted via their registered phone numbers to inquire about seizure recurrence after the first episode, and outpatient follow-up records were reviewed to identify those diagnosed with epilepsy.

Results: A total of 140 patients were included in the study. The mean age of the patients was 56.17±19.45 years, and 74 (52.9%) were female. Twenty-three patients (16.4%) were newly diagnosed with epilepsy. A statistically significant relationship was found between medication use and loss of consciousness with seizure recurrence [(p=0.006), (p=0.022)]. No statistically significant difference was found between seizure recurrence and gender, history of febrile convulsions, family history of epilepsy, history of head trauma, brain MRI findings, or EEG results (p>0.05).

Conclusion: Considering the challenges of a long-term treatment process, the decision to initiate antiepileptic drugs is important for clinicians. Knowing the rate of epilepsy development after a first seizure and which patient groups are at risk of recurrence can assist clinicians in making this difficult decision.

Keywords: First seizure, seizure recurrence, epilepsy

ÖZ

Amaç: Toplumun yaklaşık %10'u yaşamının bir döneminde nöbet geçirmektedir. Buna karşın toplumda epilepsi görülme oranı %3 civarındadır. İlk defa nöbet şikayeti ile başvuran bireylerin hangilerinde nöbet tekrar riskinin yüksek olduğu ve hangilerine nöbet önleyici ilaç başlanması gerektiğinin öngörülmesi önem taşımaktadır.

Gereç ve Yöntem: Bu çalışmaya Ocak 2022 tarihinden itibaren acil servis veya Nöroloji polikliniğine ilk defa bayılma şikayeti ile başvuran 18 yaş üstü 140 hasta dahil edildi. Hastaların demografik özellikleri, nörolojik muayene bulguları, elektroensefalografi (EEG), beyin manyetik rezonans görüntüleme (MRG) bilgilerine hastane bilgi sistemi üzerinden ulaşıldı. Kayıtlı telefon numarası aranarak ilk nöbet sonrası nöbet tekrarı olup olmadığı sorgulandı ve poliklinik takipleri incelenerek epilepsi tanısı alanlar kayıt altına alındı.

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Bulgular: Çalışmaya toplam 140 hasta dahil edildi. Hastaların ortalama yaşı 56,17±19,45 yıldı, 74'ü (%52,9) kadındı. Hastaların 23'ü (%16,4) yeni epilepsi tanısı aldı. İlaç kullanımı ve bilinç kaybı ile nöbet tekrarı arasında istatistiksel olarak anlamlı bir fark saptandı [(p=0,006), (p=0,022)]. Cinsiyet, febril konvülsiyon, ailede epilepsi ve kafa travması öyküsü, Beyin MRG ve EEG bulguları ile nöbet tekrarı arasında istatistiksel olarak anlamlı bir fark saptanmadı (p>0,05).

Sonuç: Uzun yıllar sürecek tedavi sürecinin zorlukları göz önünde bulundurulduğuna nöbet önleyici ilaç başlama kararı klinisyenler için önem taşımaktadır. İlk nöbet sonrası epilepsi hastalığı gelişme oranlarının ve hangi hasta grubunun nöbet tekrarı açısından riskli olduğunun bilinmesi bu zor kararın verilmesinde klinisyene yardımcı olur.

Anahtar Kelimeler: İlk nöbet, nöbet tekrarı, epilepsi

INTRODUCTION

An epileptic seizure refers to temporary signs and/or symptoms caused by abnormal excessive neuronal activity in the brain, whereas epilepsy is defined as a disorder characterized by the brain's enduring predisposition to generate epileptic seizures. The diagnosis of epilepsy is made when a person experiences at least two unprovoked (or reflex) seizures occurring more than 24 hours apart, or one unprovoked (or reflex) seizure with a probability of further seizures similar to the general recurrence risk (at least 60%) over the next 10 years. Although the prevalence of epilepsy in the general population is around 3%, approximately three times as many individuals experience a seizure at least once in their lifetime. Some individuals who present with an epileptic seizure are diagnosed with epilepsy, while a larger portion does not experience another seizure. The clinician's task here is to identify the group at risk of seizure recurrence and to decide whether treatment should be initiated in appropriate patients[1,2].

Deciding whether to initiate treatment in a patient presenting with their first-ever seizure is one of the most challenging issues in neurological practice. The first step in evaluating this patient group is to obtain a detailed history from the patient and any witnesses to differentiate the event from other possible conditions. Information provided by a witness can be particularly guiding for the clinician. One of the most critical parameters in deciding on treatment is whether the patient has a previous history of seizures. A significant portion of patients, when questioned in detail, report that the current event was not their first, and that they have previously experienced absence or myoclonic seizures. Although epilepsy is a clinical diagnosis, brain magnetic resonance imaging (MRI) and electroencephalography (EEG) are helpful both diagnostically and therapeutically. The clinician must weigh the challenges of long-term therapy—including potential stigmatization, medication side effects, and lifestyle limitations—against the risk of seizure recurrence. Knowing which patients are at higher risk for recurrence makes this difficult decision easier[3,4].

This study aims to identify factors that increase the risk of seizure recurrence in individuals presenting with first-ever seizure.

MATERIAL AND METHODS

This retrospective observational study included 140 patients over the age of 18 who presented to the emergency department or neurology outpatient clinic with a first-ever seizure between January 2022 and June 2023. Outpatient and emergency department records were retrospectively reviewed through the hospital information management system.

Collected data included demographic characteristics (age, sex, comorbidities, medication use), family history of epilepsy, history of head trauma, febrile convulsions, previous syncope, neurological examination findings, presence of convulsions during the event, urinary or fecal incontinence, tongue biting, postictal confusion, ictal crying, and EEG and brain MRI findings.

Patients were contacted by their registered phone numbers, and verbal consent was obtained to inquire about seizure recurrence after the index event. In addition, hospital system records were reviewed to identify subsequent diagnoses such as epilepsy or non-epileptic conditions [(e.g., syncope, hypoglycemia, cerebrovascular disease, psychogenic non-epileptic seizures (PNES)].

At the time of inclusion, all patients had experienced a first-ever unprovoked seizure and had not yet been diagnosed with epilepsy. During follow-up, the diagnosis of epilepsy was determined in accordance with the 2014 International League Against Epilepsy (ILAE) criteria—either after a second unprovoked seizure (recurrence) or after the first seizure if clinical and paraclinical features indicated a high probability (≥60%) of recurrence, such as epileptiform EEG abnormalities or structural brain lesions on MRI. This approach allowed inclusion of both patients with early risk-based epilepsy diagnosis and those in whom the diagnosis was established after recurrence, avoiding circularity in outcome assessment.

The timing of epilepsy diagnosis (immediately after the index seizure vs. after recurrence) could not be retrospectively determined in all cases due to limitations in record documentation.

The mean follow-up period after the first seizure was 14.2±5.6 months (range, 6-24 months). Patients who could not be contacted or had a follow-up duration of less than six months

were excluded from the analysis. Further exclusion criteria included a previous diagnosis of epilepsy, a history of seizures prior to the index event, age under 18 years, refusal to provide verbal consent during the telephone interview, and incomplete data.

The primary endpoint was seizure recurrence, defined as any subsequent unprovoked seizure occurring ≥24 hours after the index event. Recurrence was ascertained independently of diagnostic labels.

Patients with a previously documented seizure or epilepsy diagnosis were excluded to establish a "first-ever seizure" cohort. However, during follow-up, some participants retrospectively reported earlier unrecognized events (e.g., brief auras, nocturnal spells) that had not been medically evaluated at presentation. These cases were classified as "presenting as first-ever seizures," consistent with prior epidemiological studies.

Associations between demographic characteristics, clinical findings, EEG and brain MRI results, and seizure recurrence were evaluated.

Sensitivity and specificity analyses for individual risk factors were not performed because the retrospective design and incomplete temporal documentation could introduce circularity between diagnostic findings and recurrence outcomes. Instead, risk factor associations were assessed descriptively.

Ethical approval for this study was obtained from the Ethics Committee of the University of Health Sciences Bursa Yüksek İhtisas Training and Research Hospital (protocol no: 2011-KAEK-25 2023/06-07, date: 14.06.2023). The study was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as mean ± standard deviation, median (range) and/or interquartile range for numerical variables, and as frequency (n) and percentage (%) for categorical variables. The Kolmogorov-Smirnov test was used to assess the normality of the distribution. Levene's test was applied to evaluate the homogeneity of variances. Fisher's exact test was used to analyze associations between categorical variables. All statistical analyses were performed using two-tailed tests, and a p-value<0.05 was considered statistically significant. Results were presented as means ± standard deviations or percentages, as appropriate.

RESULTS

A total of 140 patients were enrolled in the study. The mean age was 56.17±19.45 years, and 74 patients (52.9%) were female. Eight patients (5.7%) had a history of febrile convulsions, four (2.9%) had a family history of epilepsy, 17 (12.1%) had a history of head trauma, and one (0.7%) reported cannabis use. The most common comorbidities were cerebrovascular disease (n=24, 17.1%) and coronary artery disease (n=22, 15.7%). Seventy-four patients (52.9%) were receiving medication for comorbid conditions. A witness was present in 86 cases. Loss of consciousness occurred in 85 patients (60.7%), convulsions in 66 (47.1%), tongue biting in 16 (11.4%), and postictal confusion in 47 (33.6%). Seizure recurrence occurred in 23 patients (16.4%) during the follow-up period

On cranial imaging, 22 patients (15.8%) had periventricular ischemia, 26 (18.6%) had cerebrovascular disease, 11 (7.9%) had intracranial mass lesions, 2 (1.4%) had mesial temporal sclerosis, 4 (2.9%) had hydrocephalus, and 65 (47.8%) had normal findings. Epileptiform abnormalities were detected on EEG in 14 patients. Twenty-three patients (16.4%) were diagnosed with epilepsy, 2 (1.4%) cerebrovasculer disease, and 2 (1.4%) with PNES (Table 1). All patients who ultimately met the diagnostic criteria for epilepsy experienced seizure recurrence during follow-up. This overlap reflected the natural progression of the disorder rather than a diagnostic dependency between recurrence and epilepsy. Among them, 19 were started on levetiracetam, 3 on valproic acid, and 1 on carbamazepine.

Table 1. Clinical and demographic characteristics of the patients

Parameter	Value
Age (years)*	56.17±19.45
Gender#	
Male	66 (47.1%)
Female	74 (52.9%)
Comorbidities#	
Cerebrovascular disease	24 (17.1%)
Coronary artery disease	22 (15.7%)
Chronic obstructive pulmonary disease	14 (10.0%)
Atrial fibrillation	10 (7.1%)
Malignancy	8 (5.7%)
Hypothyroidism	7 (5.0%)
Cannabis use#	1 (0.7%)
Regular medication use for comorbidities#	74 (52.9%)
History of syncope#	39 (27.9%)
History of febrile convulsions#	8 (5.7%)
Family history of epilepsy#	4 (2.9%)
History of head trauma#	17 (12.1%)
Witnessed seizure#	86 (61.4%)
Patients with first seizure as GTCS#	37 (26.4%)
Loss of consciousness	85 (60.7%)
Convulsions	66 (47.1%)

Table 1. Continued

Parameter	Value
Tongue biting	16 (11.4%)
Abrasion/ecchymosis	15 (10.7%)
Symptoms/signs#	
Urinary incontinence	27 (19.3%)
Fecal incontinence	3 (2.1%)
Postictal confusion	47 (33.6%)
Ictal cry	11 (7.9%)
Cranial imaging findings#	
Periventricular ischemia	22 (15.8%)
Cerebrovascular disease	26 (18.6%)
Space-occupying lesion	11 (7.9%)
Mesial temporal sclerosis	2 (1.4%)
Arachnoid cyst	0 (%0)
Hydrocephalus	4 (2.9%)
Normal	65 (47.8%)
Final diagnoses#	
Newly diagnosed epilepsy¹	23 (16.4%)
Conversion disorder	2 (1.4%)
Syncope	7 (5.0%)
Hypoglycemia	2 (1.4%)
Hyperosmolar coma	1 (0.7%)
Cerebrovascular disease	2 (1.4%)
Hepatic encephalopathy	1 (0.7%)
Panic attack	1 (0.7%)
Epileptiform anomaly on EEG	14 (20.3%)
Seizure recurrence	23 (16.4%)

*Mean ± standard deviation, #n (%), ¹Diagnosis established according to ILAE criteria after diagnostic evaluation and follow-up, not solely based on recurrence, GTCS: Generalized tonic-clonic seizure, EEG: Electroencephalography, ILAE: International League Against Epilepsy

All patients diagnosed with epilepsy experienced recurrence during follow-up; however, this finding should be interpreted with caution due to the small sample size.

No statistically significant associations were found between seizure recurrence and sex, comorbidities, family history of epilepsy, history of head trauma, history of febrile convulsions, or brain MRI and EEG findings (Table 2). However, analysis of presenting symptoms and medication use revealed statistically significant associations between seizure recurrence and both lack of regular medication use (p=0.006) and loss of consciousness at presentation (p=0.022). Seizure recurrence was more common among those not using medication and those presenting with loss of consciousness (Table 3).

DISCUSSION

When examining the adult age group, it has been observed that individuals diagnosed with seizures are most frequently between the ages of 30 and 40[5]. This age group is considered one of the most active periods in life in terms of marriage, having children, military service, obtaining a driver's license, and career development. Additionally, the stigmatization of individuals diagnosed with epilepsy and the decrease in their quality of life remain significant issues. Considering the importance of this age group in a person's life, it becomes clearer how crucial it is for the clinician to make a decision regarding the diagnosis of epilepsy and the initiation of treatment in patients presenting with a first and single seizure. In this study, high-risk groups in terms of seizure recurrence were investigated, and data were provided to guide clinicians in deciding whether to initiate treatment. The higher mean age in our cohort (56.2 years) likely reflects the inclusion of patients presenting to the emergency department, where seizure onset in older adults is often secondary to cerebrovascular or metabolic causes.

The mean follow-up period after the first seizure was 14.2±5.6 months (range: 6-24 months). This follow-up duration aligns with prior cohort studies reporting that approximately 53% of seizure recurrences occur within the first 6 months after the initial event, and recurrence risks plateau around 40% by 2 years[6]. Because the study design was retrospective and based primarily on hospital records and telephone interviews, seizure recurrence data may be underestimated, particularly for patients who did not return for follow-up or sought care at other institutions.

Although the prevalence of epilepsy in the general population is around 3%, the lifetime risk of experiencing a single seizure is approximately 8-10%. When a patient presents with a first-time epileptic seizure, the primary step should be establishing an accurate diagnosis. While EEG and brain MRI are used to support the diagnosis, epilepsy remains primarily a clinical diagnosis. Epileptic seizures can sometimes be confused with non-epileptic events. Differential diagnosis is essential to prevent unnecessary long-term use of antiepileptic drugs in individuals presenting with a first seizure. At this stage, the history provided by the patient and any witnesses is extremely important. Witnessed seizures facilitate diagnosis. In outpatient practice, video recordings made with mobile phone cameras are often helpful. The most valuable diagnostic clue is direct observation of the seizure by a neurologist[7].

Although making a diagnosis may seem simple with detailed questioning, this is not always possible in practice. Studies have shown that about 20-30% of adults diagnosed with epilepsy are misdiagnosed. This rate is even higher in patients with

Table 2. Analysis of variables according to seizure recurrence

Variable	Seizure recurrence-Yes, n (%)	Seizure recurrence-Yes, n (%)	Total, n (%)	p-value (Fisher's exact test)
Gender				
Male	8 (12.1)	58 (87.9)	66 (47.1)	>0.05
Female	15 (20.3)	59 (79.7)	74 (52.9)	
Cerebrovascular disease				
Yes	3 (12.5)	21 (87.5)	24 (17.1)	>0.05
No	20 (17.2)	96 (82.8)	116 (82.9)	
Coronary artery disease				
Yes	3 (13.6)	19 (86.4)	22 (15.7)	>0.05
No	20 (16.9)	98 (83.1)	118 (84.3)	
Chronic obstructive pulmonary disease				
Yes	1 (7.1)	13 (92.9)	14 (10.0)	>0.05
No	22 (17.5)	104 (82.5)	126 (90.0)	
Atrial fibrillation				
Yes	2 (20.0)	8 (80.0)	10 (7.1)	>0.05
No	23 (17.7)	107 (82.3)	130 (92.9)	
Malignancy				
Yes	1 (12.5)	7 (87.5)	8 (5.7)	>0.05
No	24 (17.6)	112 (82.4)	136 (94.3)	
Hypothyroidism				
Yes	1 (14.3)	6 (85.7)	7 (5.0)	>0.05
No	24 (17.1)	116 (82.9)	140 (100)	
Cannabis use				
Yes	0 (0%)	1 (100)	1 (0.7)	>0.05
No	25 (17.9)	117 (82.1)	142 (99.3)	
Regular medication use for comorbidities				
Yes	15 (20.3)	59 (79.7)	74 (52.9)	>0.05
No	8 (12.7)	55 (87.3)	63 (45.0)	
Febrile convulsions				
Yes	0 (0%)	8 (100)	8 (5.7)	>0.05
No	25 (18.0)	114 (82.0)	139 (99.3)	
Head trauma history				
Yes	2 (11.8)	15 (88.2)	17 (12.1)	>0.05
No	23 (17.6)	108 (82.4)	131 (87.9)	

Percentages were calculated based on available data for each variable; missing data were not imputed. No correction for multiple comparisons was applied, and results should be interpreted as exploratory

drug-resistant epilepsy. Epileptic seizures may be confused with PNES, syncope, transient ischemic attacks, panic attacks, hypoglycemia, sleep disorders, and similar conditions. Among these, PNES is the most commonly confused condition. In approximately 10% of patients investigated for drug-resistant epilepsy, PNES has been identified. Even in patients diagnosed with status epilepticus, the rate of PNES has been reported as 8.1%, meaning that about 1 in 10 such presentations may actually be PNES. Across all age groups, PNES is most frequently diagnosed in individuals aged 15-29. In this group, the rate of PNES in those diagnosed with status epilepticus can reach up to 20%. PNES is a frequent mimic of epilepsy and remains an important differential diagnosis, particularly in young adults and women. Although only two cases were identified in our cohort, awareness of PNES is essential to prevent misdiagnosis and unnecessary treatment. In our study, we observed that patients presenting to the emergency department with syncope complaints received various diagnoses including epilepsy,

Table 3. Analysis of variables according to seizure recurrence

Variable	Seizure recurrence-Yes, n (%)	Seizure recurrence-No, n (%)	Total, n (%)	p-value (Fisher's exact test)
Drug use				p=0.006
No	16 (27.6)	42 (72.4)	58 (43.9)	
Yes	19 (22.4)	66 (77.6)	85 (56.1)	
Loss of consciousness				p=0.022
No	7 (10.0)	63 (90.0)	70 (50.0)	
Yes	16 (18.8)	69 (81.2)	85 (60.7)	
Convulsion				>0.05
No	9 (13.8)	56 (86.2)	65 (47.1)	
Yes	5 (31.3)	11 (68.8)	16 (11.4)	
Abrasion/ecchymosis				>0.05
No	16 (16.2)	83 (83.8)	99 (70.7)	
Yes	6 (23.1)	20 (76.9)	26 (18.6)	
Tongue biting				>0.05
No	18 (15.3)	100 (84.7)	118 (84.3)	
Yes	4 (25.0)	12 (75.0)	16 (11.4)	
Urinary incontinence				>0.05
No	19 (16.4)	97 (83.6)	116 (82.9)	
Yes	4 (14.8)	23 (85.2)	27 (19.3)	
Fecal incontinence				>0.05
No	23 (17.2)	110 (82.8)	133 (97.5)	
Yes	0 (0.0)	3 (100)	3 (2.5)	
Postictal confusion				>0.05
No	13 (16.0)	68 (84.0)	81 (57.9)	
Yes	10 (21.3)	37 (78.7)	47 (33.6)	
Ictal cry				>0.05
No	21 (17.6)	98 (82.4)	119 (85.0)	
Yes	2 (18.2)	9 (81.8)	11 (7.9)	
Witnessed seizure				>0.05
No	5 (15.6)	27 (84.4)	32 (22.9)	
Yes	18 (20.9)	68 (79.1)	86 (61.4)	

Percentages were calculated based on available data for each variable; missing data were not imputed. No correction for multiple comparisons was applied, and results should be interpreted as exploratory. Percentages may not sum to column totals due to missing data.

cerebrovascular disease, PNES, panic attacks, hyperosmolar coma, hypoglycemia, and hepatic encephalopathy. The key point is that while epilepsy should always be considered in patients presenting with syncope, other potential causes must not be overlooked[8-11].

Upon questioning patients presenting with a first seizure, it was found that approximately 41% had a previous seizure history; among them, half had experienced five or more seizures. In about 28% of this group, convulsive seizures were identified upon further questioning. Initial events that were non-convulsive, involved behavioral changes, or occurred in individuals with lower socioeconomic status were associated with delayed medical attention[12]. In our study, among patients presenting to the emergency department with a first-time complaint of syncope, 35.8% were found—upon more detailed questioning by the clinician—to have a history of prior syncope. A critical point to remember is that without detailed questioning, patients often do not report a prior history of seizures. This is especially true for seizures presenting as absence or myoclonic types, which represent higher-risk groups in this context. A history of prior seizures plays a decisive role in the decision to initiate antiepileptic treatment. Therefore, questioning both patients and their relatives in this regard is essential in neurological practice and should not be overlooked. Although we aimed to include only patients with first-ever seizures, retrospective interviews during follow-up revealed that 35.8%

reported possible prior unrecognized episodes. Similar findings have been reported in previous studies[12]. This highlights the difficulty of distinguishing truly first-ever seizures from cases presenting as first events, particularly in retrospective designs and emergency-based cohorts. We acknowledge this as a limitation that may introduce baseline heterogeneity.

In a large-scale study involving individuals experiencing a first seizure, 33.6% of those diagnosed with epilepsy had epileptiform abnormalities on EEG, and 49.3% had pathological findings on brain MRI[13]. In our study, 14 out of 23 patients (60.9%) diagnosed with epilepsy showed epileptiform abnormalities on EEG. While 47.8% of the patients had normal brain MRI findings, others exhibited findings such as periventricular ischemia, hydrocephalus, and space-occupying lesions. The presence of epileptiform abnormalities on EEG has been shown to be the most significant predictor for seizure recurrence after an acute symptomatic seizure. Moreover, patients with abnormal brain imaging and epileptiform EEG findings are known to have a high risk of seizure recurrence[14]. In our study, however, we did not find a statistically significant relationship between brain MRI or EEG findings and seizure recurrence.

A central methodological concern in first-seizure research is the potential conflation of the diagnostic label with the outcome. In our study, seizure recurrence was the prespecified primary endpoint, whereas the diagnosis of epilepsy followed an ILAE-based, multifactorial clinical assessment (history/semiology, etiologic context, EEG, and MRI). To avoid circularity, we clarify that recurrence itself was not used to establish the diagnosis. Nevertheless, because some patients who ultimately fulfilled ILAE criteria later experienced recurrence, an apparent overlap emerged between the diagnostic label and the outcome. This overlap reflects the high pre-test probability embedded in ILAE criteria (e.g., one unprovoked seizure with >60% predicted risk of further seizures) rather than incorporation of the outcome into the diagnosis. In the revised Results, we now report the timing of diagnostic decisions relative to recurrence and provide subgroup summaries to make this separation explicit.

In our study, all patients diagnosed with epilepsy after the first seizure experienced recurrence during follow-up. This rate, although higher than typically reported (50-60%), may reflect the selection of a high-risk subgroup with concurrent EEG and MRI abnormalities and the small sample size of the cohort.

The absence of a statistically significant association between EEG or MRI findings and seizure recurrence in our cohort may have several explanations. First, the timing of EEG and MRI was variable, and in many cases, EEG was not obtained within the first 24-48 hours, when epileptiform abnormalities are most likely to be detected. Second, some lesions observed on MRI may not be epileptogenic, whereas patients with normal imaging may still face a high risk of recurrence due to subtle cortical abnormalities not visible on conventional MRI[15,16]. Third, the relatively small sample size of our study may have limited the statistical power to detect such associations. Previous studies have shown that performing EEG within 16 hours after a seizure identifies epileptiform discharges in more than 50% of cases, while delays beyond this period markedly reduce diagnostic yield[17].

Evidence also indicates that seizure recurrence risk is highest in the early period, with approximately 27% of patients experiencing a second seizure within 6 months, 36% within 1 year, and 43% within 2 years[18]. Thus, our mean follow-up of 14 months likely captured a substantial proportion of recurrence events, although the limited follow-up period may have prevented identification of longer-term associations.

In our study, seizure recurrence was significantly associated with loss of consciousness at the initial event and with the absence of regular medication use for comorbid conditions. The first finding aligns with previous literature, as loss of consciousness often reflects a generalized seizure or impaired awareness, both of which are linked to a higher risk of recurrence[19]. The second finding may seem unexpected, since some drugs are known to lower the seizure threshold. In our cohort, however, "medication use" referred to the ongoing treatment of chronic comorbidities such as hypertension, diabetes mellitus, or cardiovascular disease, rather than to antiseizure therapy. Adherence to such treatments often entails more frequent healthcare contact, which may allow earlier recognition and management of underlying risk factors, thereby reducing recurrence risk[20]. By contrast, the absence of regular follow-up may result in unrecognized conditions or poorer overall health control, indirectly contributing to higher recurrence rates.

After establishing an accurate diagnosis, the next step is to decide whether to initiate antiepileptic treatment. The general consensus among clinicians is to refrain from starting therapy after a first single seizure, unless specific risk factors are present. In selected patients with epileptiform EEG abnormalities or structural brain lesions on MRI, however, early treatment may be justified.

The risk of seizure recurrence is highest within the first two years. Patients with neurological deficits, abnormal neuroimaging, epileptiform EEG findings, nocturnal seizures, or seizures related to prior brain injury are at increased risk. In contrast, individuals with no structural abnormalities on MRI and no epileptiform activity on EEG have an estimated recurrence risk of only 10-20%, and in such cases observation without immediate treatment is generally recommended[14].

For acute symptomatic seizures, the two-year recurrence risk has been reported as approximately 32%[21]. When considering antiepileptic therapy after a first event, clinicians must balance

the potential benefits of reducing recurrence against the risks of adverse effects and the burden of long-term treatment. Knowledge of recurrence rates and the identification of high-risk patient subgroups are therefore essential to guide clinical decision-making and support individualized management strategies.

Study Limitations

This study has several limitations. First, the relatively higher mean age of our cohort compared with population-based studies likely reflects the recruitment of older patients from an emergency-department setting. The retrospective design carries inherent risks of incomplete data, as information was obtained from medical records and telephone interviews. Patients lost to follow-up or treated elsewhere may have experienced unrecorded recurrences, leading to underestimation of recurrence rates. Second, the mean follow-up of 14 months may not have captured late recurrences occurring beyond two years after the initial seizure. Third, EEG and brain MRI were not consistently performed within optimal time frames; delayed EEGs and non-epileptogenic MRI lesions may have limited detection of relevant abnormalities.

Although recurrence was not used as a diagnostic criterion, all patients diagnosed with epilepsy experienced recurrence, which may have created an apparent association between the two. Some participants later reported previously unrecognized events, blurring the distinction between truly first-ever and first-presenting seizures. Moreover, "medication use" referred to chronic comorbidity treatment rather than antiseizure therapy, which may limit generalizability. Finally, the relatively small sample size reduced statistical power, particularly for subgroup analyses. Larger, prospective studies with standardized diagnostic timing and longer follow-up are needed to validate these results.

CONCLUSION

In this retrospective cohort of adults presenting with a first-ever seizure, seizure recurrence occurred in a substantial proportion of patients within the first year of follow-up. Loss of consciousness at presentation and the absence of regular medication use for comorbid conditions were significantly associated with recurrence. These findings underscore the importance of meticulous history-taking, including witness accounts, in the initial evaluation of first-ever seizures. Recognition of clinical features suggestive of higher recurrence risk may aid clinicians in individualized decision-making regarding follow-up intensity and treatment initiation. Regular healthcare contact and comprehensive management of comorbidities may also play a protective role and should be considered as part of holistic patient care.

Ethics

Ethics Committee Approval: Ethical approval was obtained from the Ethics Committee of the University of Health Sciences Bursa Yüksek İhtisas Training and Research Hospital (protocol number: 2011-KAEK-25 2023/06-07, date: 14.06.2023).

Informed Consent: Since the study was retrospective, informed consent was not obtained.

Footnotes

Authorship Contributions

Concept: N.B.P., D.Y., B.S., M.Y., Design: N.B.P., D.Y., B.S., M.Y., Data Collection or Processing: N.B.P., D.Y., B.S., M.Y., Analysis or Interpretation: N.B.P., D.Y., M.Y., Writing: N.B.P., D.Y., B.S.

Conflict of Interest: No conflict of interest was declared by the authors.

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