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Cognitive Disorders in Adults Treated for Epilepsy at University Teaching Hospitals in Ouagadougou, Burkina Faso

Research Article

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Abstract

Objective: To study cognitive impairments in adult patients with epilepsy followed at university teaching hospitals in Ouagadougou.

Methodology: This was a descriptive and analytical cross-sectional study with prospective data collection, conducted from January 31 to August 30, 2024, in the neurology departments of Ouagadougou's university hospitals. Data were collected using Kobo Collect software version 2022.3.6 and analyzed with Epi Info version 7.2.2.16. Quantitative variables were expressed as mean ± standard deviation, while qualitative variables were reported as counts and percentages. The Chi-square test was used to compare qualitative variables when sample sizes were ≥ 5; Fisher's exact test was used for smaller samples (< 5). Student's t-test was employed to compare quantitative variables. To identify factors associated with cognitive impairment, multivariable linear regression was performed following bivariate analysis. Statistical significance was set at $p < 0.05$.

Results: A total of 106 adult patients with epilepsy were included in the study, with a male predominance (66.98%) and a mean age of 34.88 ± 14.22 years. Clinically, 71.70% of patients experienced generalized seizures, and the mean duration of epilepsy was 10.69 years. EEGs were performed in 80.19% of patients and revealed epileptic paroxysmal abnormalities in 63.53% of cases. The most commonly identified etiologies were central nervous system infections (19.81%), sequelae of traumatic brain injury (17.92%), and post-stroke sequelae (16.04%). Most patients (87.70%) were on monotherapy, with carbamazepine being the most frequently prescribed antiepileptic drug. Cognitive impairment was identified in 60.38% of patients, with moderate to severe impairment in 12.13% of cases. The most affected domains were attention and calculation (53.77%), followed by memory (27.36%). Factors significantly associated with cognitive impairment included age ≥ 45 years (OR = 4.5; p = 0.0008), unpredictable seizure occurrence (nocturnal or diurnal) (OR = 5.7; p = 0.0000), and post-stroke epilepsy etiology (OR = 2.2; p = 0.007).

Conclusion: Cognitive impairment appears to be a common complication of epilepsy, underscoring the need for comprehensive screening and management—not only of epilepsy itself but also of cognitive deficits, which may further compromise patients' quality of life and independence.

Keywords: Epilepsy; Adults; MMSE; Cognitive impairment; Age ≥ 45 years; Post-stroke sequelae; Diurnal and

Introduction

Epilepsy is a chronic, non-communicable neurological disorder of the central nervous system that can affect individuals of all age groups [1]. It affects approximately 50 million people worldwide, making it one of the most common neurological diseases [2]. In sub-Saharan Africa, its prevalence is estimated at between 7 and 14 per 1,000 in habitants, which is about 2 to 3 times higher than in Europe or North America [3]. Beyond seizures, individuals living with epilepsy frequently experience neuropsychiatric comorbidities, particularly cognitive impairments, reported in 30% to 70% of patients depending on the study [4]. These impairments affect various neuropsychological functions: memory in 40% to 60% of cases, attention and concentration in 30% to 50%, and executive functions in 20% to 40%, with variations depending on the type of epilepsy and the treatments administered [5,6]. In low-resource countries such as Burkina Faso, these complications are often underrecognized or underdiagnosed due to the limited availability of neuropsychological tools, a shortage of specialists, and persistent stigma [7]. A study conducted in Benin revealed that nearly 60% of patients with epilepsy had moderate to severe cognitive impairments, which were not systematically addressed [8]. In this context, the present study aims to assess the frequency, profile, and associated factors of cognitive impairments in adult patients with epilepsy followed in the University Teaching Hospitals (UTHs) of Ouagadougou (Burkina Faso), with the goal of contributing to the development of appropriate treatment and follow-up strategies for these patients.

Patients And Methods

This was a descriptive and analytical cross-sectional study with prospective data collection, conducted from January 31 to August 30, 2024, in the neurology departments of the University Teaching Hospitals (UTHs) of Tengandogo, Yalgado Ouédraogo, and Bogodogo, in Ouagadougou, Burkina Faso.

Inclusion Criteria

We included adult patients aged ≥18 years, followed in neurology for at least 6 months for epilepsy, with a diagnosis confirmed by a senior neurologist, and who provided informed consent to participate in the study. Epilepsy was defined by the occurrence of at least two clinically proven, unprovoked seizures occurring more than 24 hours apart.

Exclusion Criteria

Excluded from the study were all patients under the age of 18, those followed for less than 6 months or not followed at all, and patients with cognitive impairment predating the onset of epilepsy or with behavioral/psychiatric disorders preventing participation in the survey. Also excluded were patients who did not provide consent. Furthermore, individuals with a history of alcohol or illicit substance abuse, psychiatric illness, progressive encephalopathy, or any other progressive brain disease were excluded.

Data Collection

Data were collected using a structured questionnaire, entered into KoboCollect v.2022-3-6, stored on a computer, and analyzed using Epi Info version 7.2.2.16. Quantitative variables were expressed as means ± standard deviation, and qualitative variables as frequencies and percentages. The chi-square test was used for comparisons of qualitative variables when expected counts were ≥5; Fisher's exact test was used for counts <5. The Student's t-test was used for comparing quantitative variables. After bivariate analyses, multiple linear regression was performed to study factors associated with cognitive impairment in adult patients with epilepsy. A p-value of <0.05 was considered statistically significant.

Variables Studied

- **Sociodemographic variables**: age, gender, residence, marital status, education level.
- **Epilepsy-related variables**: duration since epilepsy onset, seizure type, age at seizure onset, epilepsy risk factors, interictal neurological abnormalities and comorbidities, electroencephalogram (EEG) findings, brain CT scan findings, epilepsy etiology, and antiepileptic treatment.
- **Cognitive impairment variables**: Mini-Mental State Examination (MMSE) score, assessment of memory, attention, language, orientation, naming, praxis, and gnosis.

Study Procedure

We contacted neurologists in the neurology departments of UTHs Tengandogo, Yalgado Ouédraogo, and Bogodogo in Ouagadougou and obtained their approval to conduct the study. We collected phone numbers and addresses of patients aged ≥18 years who had been followed for epilepsy for at least 6 months in these hospitals. These patients were contacted, and individual interviews were arranged-some during outpatient neurology consultations and others through home visits. During these interviews, we first obtained verbal and informed consent, then administered a questionnaire that covered: sociodemographic and clinical data (epilepsy history, epilepsy-related cognitive impairments, epilepsy risk

factors, neurological examination, EEG and brain CT scan findings, or any other relevant exams), and treatment data.

In a second phase, each patient underwent a neuropsychological evaluation using the Mini-Mental State Examination (MMSE). The MMSE includes 30 items assessing temporal and spatial orientation, verbal memory, attention and calculation, short-term memory, object naming, reading comprehension, language understanding, speech articulation, and graphic drawing. Each correct answer scores one point, for a maximum of 30 points. Cognitive impairment was defined as an MMSE score <27/30. Mild cognitive impairment: MMSE score between 20 and 26/30 ; moderate cognitive impairment: MMSE score between 10 and 20/30 ; severe cognitive impairment: MMSE score <10/30, typically associated with a loss of autonomy in daily life activities.

All participants, including those who had not been formally educated in French, were fluent French speakers and could use a pen. For those who were illiterate in French, the interviewer served as a translator.

Ethical and Deontological Considerations

Anonymity and confidentiality were strictly maintained. Neither names nor any identifying information appeared on the data collection forms. Authorization for data collection was granted by the management of the participating hospitals. The study findings will be shared with all relevant stakeholders.

Operational Definitions

Education levels: h*igher education*: patient who attended school and pursued studies beyond the high school diploma (baccalaureate) ; *secondary education*: patient who attended school with a level ranging from the first year of middle school up to the completion of high school (baccalaureate) ; p*rimary education*: patient who attended school up to and including the Primary School Certificate level ; n*o formal education*: patient who has not received instruction in an educational institution.

Urban area: includes provincial and regional capitals.

Rural area: includes all villages.

Daytime: from 4:00 a.m. to 6:00 p.m.

Nighttime: from 6:00 p.m. to 4:00 a.m.

Results

During the study period, we included 106 patients followed in three University Teaching Hospitals (UTHs) in the city of Ouagadougou: 53 patients (50%) at UTH-B, 41 patients (38.68%) at UTH-YO, and 12 patients (11.32%) at UTH-T. The sample consisted of 71 men (66.98%) and 35 women (33.02%), with a male-to-female ratio of 2.03.

The mean age of the patients was 34.88 ± 14.22 years (ranging from 18 to 67 years). The age group 18 to 25 years was the most represented, accounting for 34.91% of patients. Figure 1 show the distribution of patients by age group.

The average age at onset of first seizures was 24.19 ± 17.77 years (range: 0-64 years). The majority of patients (35.85%) experienced their first seizure between the ages of 10 and 20. Generalized-type seizures were more frequently reported, with 76 patients (71.70%), compared to 30 patients (28.30%) with focal seizures. Seizures occurring annually were the most common pattern, observed in 49 cases (46.23%). The mean duration of active epilepsy was 10.69 ± 9.50 years (range: 1 to 42 years); most patients (60 cases, 56.6%) had been living with active epilepsy for ≤10 years. Random seizure occurrence (both daytime and nighttime) was the most frequent pattern, reported in 66 cases (62.26%).

The most common interictal neurological signs were memory impairment in 13 patients (12.26%), praxis disorders in 12 patients (11.32%), and hemiparesis in 11 patients (10.38%). Table 2 below presents the distribution of patients according to the clinical characteristics of epileptic seizures and interictal neurological signs.

An EEG was performed in 85 patients (80.19%); abnormalities were found in 54 patients (63.53%), including epileptic paroxysmal abnormalities in 58 patients (54.71%) and background activity slowing in 6 patients (7.06%). A total of 60 patients (56.60%) underwent a brain CT scan and/or brain MRI. Cortical atrophy, with or without circumscribed or diffuse subcortical involvement, was the most frequent epileptogenic neuro-radiological lesion, found in 19 cases (31.67%).

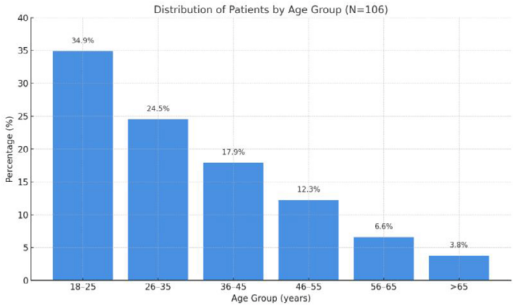

Figure 1: Distribution of patients by age group (N=106).

Table I: Distribution of Patients According to Sociodemographic Characteristics (N=106).

Sociodemographic characteristics	Number (N=106)	Percentage (%)
Occupation		
Housewife	7	6,6
Student	24	22,64
Trader	20	18,87
Farmer	8	7,55
Government employee	12	11,32
Informal sector worker	17	16,04
Retired	3	2,83
Unemployed	15	14,15
Marital Status		
Single	60	56.6
Married	42	39.62
Widowed	4	3.77
Education Level		
Higher education	15	14.15
Secondary education	47	44.34
Primary education	28	26.42
No formal education	16	15.09

An etiology of epilepsy was identified in 83 patients (78.30%), while in 23 patients (21.70%) no cause could be determined. Among the identified etiologies, sequelae of central nervous system infections (21 cases, 19.81%), sequelae of traumatic brain injuries (19 cases, 17.92%), and stroke-related sequelae (17 cases, 16.04%) were the most common.

All patients received long-term antiepileptic treatment: monotherapy in 93 patients (87.74%), dual therapy in 12 patients (11.32%), and triple therapy in 1 patient (0.94%). Carbamazepine, prescribed in 58 patients (54.72%), was the most commonly used antiepileptic drug.

Figure 2 illustrates the distribution of patients according to the antiepileptic medication used.

The Mini-Mental State Examination (MMSE) was administered to all 106 patients being followed for epilepsy. The average MMSE score obtained was 25.16 ± 5.23 points (range: 7 to 30 points). An MMSE score of ≤ 26 points, indicating the presence of cognitive impairment, was found in 64 patients (60.38%). Patients with moderate to severe cognitive impairment (MMSE < 20 points) accounted for 13 cases (12.26%). Table IV shows the distribution of patients according to their MMSE scores.

Table 2: Distribution of Patients According to Clinical Characteristics of Epileptic Seizures and Interictal Neurological Signs

Clinical characteristics of epileptic seizures and inter ictal neurological signes	Number (N=106)	Percentage (%)
Age groups		
≤ 10 years	19	17.92%
11–20 years	38	35.85%
21–30 years	10	9.43%
31–40 years	14	13.21%
41–50 years	14	13.21%
51–60 years	4	3.77%
≥ 61 years	7	6.70%
Seizure Types		
Generalized seizures	**76**	**71.70%**
– Tonic-clonic seizures	73	68.87%
– Absence seizures	1	0.94%
– Myoclonic seizures	2	1.89%
Focal seizures	**30**	**28.30%**
– With impaired awareness	8	7.55%
– Without impaired awareness	22	20.75%
Frequency of epileptic seizures		
Yearly	49	46.23%
Monthly	43	40.57%
Weekly	7	6.60%
Daily	7	6.60%
Occurrence pattern		
Daytime and nighttime	66	62.26%
Nighttime only	20	18.87%
Daytime only	20	18.87%
Duration of epilepsy		
≤ 10 years	60	56.60%
11–20 years	24	22.64%
21–30 years	16	15.09%
≥ 31 years	6	5.66%
Neurological signs		
Memory deficit	13	12.26%
Praxis disorders	12	11.32%
Aphasia (expressive and/or receptive)	9	8.49%
Hemiparesis	11	10.37%
Visual field deficit	5	4.71%

Table 3: Distribution of Patients According to Interictal EEG Findings, Brain Imaging Results, and Epilepsy Etiologies

Paraclinical and Etiological Characteristics	Number (n=106)	Percentage (%)
EEG findings		
Epileptic paroxysmal abnormalities	**54**	**63.52%**
Generalized	16	18.82%
Generalized and focal	4	4.70%
Focal	28	32.94%
— Frontal	11	12.94%
— Temporal	4	4.70%
— Fronto-temporal	13	15.29%
— Hemispheric	2	2.35%
Background activity slowing	**6**	**7.05%**
Normal EEG	**31**	**36.47%**
Imaging Finding		
Cortical and/or subcortical atrophy (focal or diffuse)	19	31.67%
Cavernoma	1	1.67%
Meningioma	2	3.33%
Calcified neurocysticercosis	2	3.33%
Focal hypodensity	5	8.33%
Cortical development malformation (polymicrogyria, schizencephaly, heterotopia)	3	5.00%
Porencephalic cavity	2	3.33%
Normal	31	51.67%
Classification of epilepsy		
Focal epilepsy	82	77.35%
Generalized epilepsy	18	16.98%
Epilepsy of unknown localization	6	5.66%
Etiology of epilepsy		
Sequelae of perinatal encephalopathy	12	11.32%
Cortical development malformations	4	3.77%
Brain tumor	2	1.88%
Presumed genetic origin	8	7.54%
Undetermined	23	21.69%

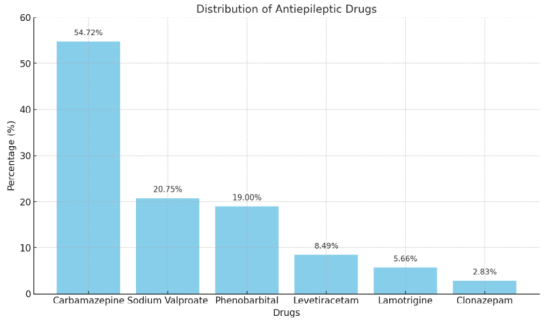

Figure 2: The distribution of adult patients followed for epilepsy according to the antiepileptic drugs used. Here is the translated version in American English:

Table 4: Distribution of adult epileptic patients according to MMSE score.

Score Category	MMSE Range	Number (N=106)	Percentage (%)
No cognitive impairment	**MMSE ≥ 27 points**	**42**	**39.62**
Cognitive impairment	**MMSE ≤ 26 points**	**64**	**60.38**
Mild cognitive impairment	20 ≤ MMSE ≤ 26 points	51	48.11
Moderate cognitive impairment	10 ≤ MMSE < 20 points	9	8.49
Severe cognitive impairment	MMSE < 10 points	4	3.77

According to the affected cognitive domains, cognitive impairments were predominantly characterized by attention and calculation deficits, present in 57 patients (53.77%), followed by memory deficits, praxis disorders, and orientation deficits, found in 29 patients (27.36%), 27 patients (25.47%), and 20 patients (18.87%), respectively.

Analytical Study

In bivariate analysis, the presence of cognitive impairment in adult epileptic patients was significantly associated with age ≥ 45 years (p = 0.034), random seizure occurrence (both night and day) (p = 0.028), high seizure frequency (weekly) (p = 0.005), and post-stroke sequelae as the etiology (p = 0.037) (Table V).

Discussion

The neurological clinical signs observed in our study-hemiparesis (10.38%), aphasia (8.49%), and visual field deficit (4.72%) -along with the reported subjective cognitive complaints such as memory problems (12.26%), praxis disturbances (11.32%), and attention deficits (11.32%),

Table 5: Results of the bivariate analysis between sociodemographic, clinical, paraclinical, and therapeutic characteristics and the presence of cognitive impairment in adult epileptic patients.

Variable	No Cognitive Impairment	Cognitive Impairment	OR [95% CI]	P-value
Sex			0.70 [0.4 - 1.02]	0.11
Female	11	24		
Male	31	60		
Marital status			1.08 [0.78 - 1.38]	0.16
Single	26	34		
Married	16	26		
Widowed	0	4		
Education level			0.62 [0.27 - 1.14]	0.95
No formal education	6	10		
Primary	10	18		
Secondary	20	27		
Higher	6	9		
Family history of epilepsy			0.70 [0.40 - 1.24]	0.21
No	32	54		
Yes	10	10		
Age at onset			1.21 [0.75 - 1.97]	0.27
<20 years	25	33		
≥20 years	17	31		
Seizure type			0.84 [0.50 - 1.41]	0.34
Focal	29	47		
Generalized	13	17		
Epilepsy duration (years)			1.14 [0.75 - 1.83]	0.21
No	18	24		
Yes	24	40		
Seizure occurrence period			1.08 [0.78 - 1.38]	0.028
Day	4	16		
Night	5	15		
Seizure frequency			4.8 [0.9 - 24.8]	0.005
Frequent (daily, weekly, monthly)	16	33		
Rare (annual)	26	31		
Etiology -Malformative			1.04 [0.78 - 1.38]	0.20

No	1	1		
Yes	0	1		
Etiology-Sequelae of traumatic brain injury			1.23 [0.9 - 1.85]	0.25
No	2	6		
Yes	4	7		
Etiology-Brain tumor			4.75 [0.75 - 1.65]	0.34
No	1	0		
Yes	1	1		
Etiology-CerebroVascular			1.08 [0.78 - 1.38]	0.037
Post-stroke sequelae	4	13		
Anoxic-ischemic	7	6		
Etiology-CNS Infectious			1.08 [0.78 - 1.38]	0.80
HIV infection	1	1		
Neurocysticercosis	1	0		
Cerebral malaria	5	7		
Meningoencephalitis	3	2		
Etiology-Presumed genetic			1.10 [0.90 - 1.45]	0.60
No	1	2		
Yes	2	2		
Etiology-Unknown			1.06 [0.80 - 1.40]	0.23
No	4	9		
Yes	4	6		
Antiepileptic treatment regimen			2.8 [0.9 - 4.8]	0.38
Monotherapy	25	58		
Dual therapy	6	6		
Triple therapy	1	0		
Sodium valproate			0.66 [0.40 - 1.10]	0.07
No	30	54		
Yes	12	10		
Lamotrigine			0.75 [0.32 - 1.748]	0.42
No	38	61		
Yes	4	3		
Levetiracetam			1.16 [0.44 - 3.04]	0.52
No	38	58		
Yes	4	6		

Phenobarbital			0.71 [0.42 - 1.20]	0.17
No	31	54		
Yes	11	10		
Clonazepam			1.15 [0.22 - 5.84]	0.45
No	40	62		
Yes	2	2		
Carbamazepine			1.39 [0.85 - 2.26]	0.09
No	22	25		
Yes	20	39		

Table 6: Multiple Logistic Regression of Factors Associated with Cognitive Impairment.

Associated Factors	Odds Ratio (OR)	95% Confidence Interval	P-value
Age (≥45 years / <45 years)	4.5	5–5.7	0.0008
Seizure frequency (frequent / rare)	0.23	-0.37–0.55	0.70
Post-stroke sequelae etiology (yes / no)	2.2	2–2.7	0.007
Seizure occurrence period (day and night / either day or night)	5.7	5.1–6.8	0.0000
Gender (male / female)	0.07	-0.15–0.15	0.99
Marital status (married / unmarried)	0.08	-0.24–0.06	0.23
Sodium valproate (yes / no)	0.09	-0.33–0.03	0.10
Phenobarbital (yes / no)	0.09	-0.24–0.111	0.48

are consistent with the predominance of structural causes of epilepsy in adults (70.75% among our patients), as commonly reported in the literature [9,10,11]. Moreover, these subjective cognitive complaints expressed during the medical history seem to be less frequent than the cognitive deficits detected through objective neuropsychological evaluation (MMSE score). This observation has also been made by Witt & Helmstaedter [12], highlighting the importance of objective neuropsychological assessments for identifying cognitive impairments associated with epilepsy.

The mean Mini-Mental State Examination (MMSE) score of 25.16 out of 30 obtained in our patient group was lower than that generally observed in the general population worldwide, where it usually ranges between 27 and 29 out of 30 [13,14]. This finding suggests a tendency toward lower cognitive performance in epileptic patients compared to the general population. This reduced cognitive performance, reflected by a mean MMSE score below the normal threshold (≥ 27 points), has also been reported in other African studies [15,16], suggesting similar patterns of cognitive impairment among epileptic patients.

The prevalence of cognitive impairment in our epileptic patient cohort was 60.38% based on our criteria, which is comparable to the 69% reported by Nindela et al. (2021) in Indonesia [17]. However, higher prevalence rates have also been observed: 74.30% by Agbetou et al. (2021) in Benin [8] and 83.90% by Harahap et al. (2022) in Indonesia [19]. On the other hand, lower prevalence was reported by Merkena MD in Ethiopia (36%) [20]. This wide variation in prevalence may be explained by several factors, including the severity of epilepsy, its duration, and the nature and

frequency of seizures.

The etiologies of epilepsy, particularly structural forms, may contribute not only to epilepsy itself but also to cognitive and even behavioral disorders. The location of the epileptogenic focus can also influence the onset of cognitive impairments. For example, temporal lobe epilepsies are particularly associated with long-term memory impairments, whereas frontal lobe epilepsies are more linked to working memory deficits. Furthermore, factors such as the duration of epilepsy, age at onset, seizure type, the presence of status epilepticus, and the cognitive side effects of antiepileptic medications are all well-documented in the literature as contributing to the onset and severity of cognitive impairment [21,22,23].

Regarding the severity of cognitive impairment, 12.26% of patients in our series exhibited moderate to severe cognitive impairment. In contrast, studies by Lestari et al. (2020) in Indonesia [24] and Kumar et al. (2019) in India [25] reported much lower rates of moderate to severe cognitive impairment, at 3% and 7% respectively. These variations may be attributed to contextual differences such as socioeconomic factors, methodologies used, cultural and environmental influences, as well as differences in patient samples. The severity of cognitive impairment can have a profound impact on patients' social and relational lives, leading to reduced autonomy, impaired social interactions, negative effects on family relationships, stigma, and loss of social status [26].

As for the affected cognitive functions and the severity of impairment, there is heterogeneity among patients, with not all cognitive domains being affected in the same individual. In adults, impairments are more often specific to certain cognitive functions [27,28]. The cognitive profile depends in part on whether the epilepsy is focal or generalized and whether its etiology is structural or genetic [29]. In our study, which was marked by a predominance of frontal and/or temporal focal epilepsies, mild cognitive impairment was the most common. This was characterized by attention and calculation difficulties (53.77%), memory deficits (27.36%), praxis impairments (25.47%), orientation deficits (18.87%), and aphasia (8.49%). Indeed, memory and language are the cognitive domains most frequently affected in temporal lobe epilepsies, although other domains may also be impaired [30,31]. Cognitive impairments in frontal lobe epilepsy primarily affect executive functions, including mental flexibility, inhibition, verbal initiation and planning, working memory, memory retrieval abilities, and language [32,33]. In our series, unfortunately, executive dysfunction was not specifically assessed.

As for genetic generalized epilepsies, found in 7.5% of our patients, their cognitive performance generally remained within normal limits, or showed mild to moderate impairments in executive functions and language [34]. These impairments may be interpreted as resulting from disruptions in neural circuits involved in attentional processes, particularly in brain regions such as the prefrontal cortex and the parietal cortex, which play a crucial role in attention regulation.

In our study, multivariate analysis revealed that age at seizure onset ≥ 45 years ($p = 0.0008$) was significantly and independently associated with the presence of cognitive impairment in epileptic patients. This observation is consistent with findings in the literature. Indeed, Norazila et al. (2017) in Malaysia [35] and Tedrus et al. (2019) in Indonesia [36] both reported that older age is correlated with a higher frequency and greater severity of cognitive impairment in epileptic patients. It is important to note that among older individuals, due to organ aging and multiple comorbidities, there is an increased prevalence of cardiovascular, cerebrovascular, and neurodegenerative diseases, particularly Alzheimer's disease and neoplasms, which could contribute to a higher incidence of both epilepsy and cognitive disorders in this segment of the population [37].

The random occurrence of seizures (both nocturnal and diurnal) also showed a significant and independent association with the onset of cognitive impairment in our patient cohort. Several studies have suggested that nocturnal seizures may impair cognitive functions more severely than daytime seizures. Indeed, epileptic activity during sleep leads to sleep fragmentation, with intra-sleep awakenings, reduced total sleep time, decreased REM sleep (a 35% to 50% reduction depending on the study), and diminished deep slow-wave sleep in favor of lighter slow-wave sleep. The consequences include daytime sleepiness and cognitive performance decline, particularly memory problems and concentration difficulties [38]. This phenomenon may be linked to disruptions in processes essential for memory consolidation and learning [39].

The post-stroke etiology of epilepsy was also identified in our study as being significantly and independently associated with cognitive impairment. Similarly, Witt and Helmstaedter identified post-stroke epilepsy as a risk factor for cognitive disorders in epileptic patients [40,41]. Indeed, it is well established that strokes are among the most common causes of both cognitive decline and epilepsy [42]. According to Godefroy et al., post-stroke cognitive impairment is common, affecting at least 50% of stroke survivors, with two-thirds having mild cognitive impairment and the remaining one-third experiencing major cognitive impairment or dementia. Post-stroke brain lesions that significantly affect cognitive function include: large left-hemispheric lesions with aphasia, recurrent strokes, multiple lacunar infarcts, silent cerebral

infarctions, cerebral or medial temporal atrophy, extensive white matter abnormalities, and post-stroke epilepsy [43]. Therefore, patients with post-stroke epilepsy face an increased risk of cognitive impairment, due to: the post-stroke sequelae, the impact of epilepsy itself, and the combined effects of both conditions [44,45,46].

Limitations Of Our Study

This was a cross-sectional study, which means that exposure and outcome were measured at the same time, making it impossible to establish a causal relationship.

The identification of cognitive impairment in our epileptic patients was based on the Mini-Mental State Examination (MMSE), which has a moderate sensitivity of approximately 70 to 80%. Moreover, the assessment of the severity of cognitive impairment and the identification of affected cognitive domains based solely on the MMSE is insufficient; a more comprehensive neuropsychological evaluation would have been necessary.

Despite these limitations, this study allowed us to obtain relevant findings, which we compared and discussed in light of existing literature.

Conclusion

Cognitive impairment is common, affecting 3 out of 5 adult patients followed for epilepsy at the university hospitals in Ouagadougou. In 90% of cases, these impairments were mild and primarily involved deficits in attention and calculation, as well as memory, praxis, and orientation disturbances.

Several factors were identified as independently and significantly associated with cognitive impairment in epileptic patients, including: Age over 45 years, random (nocturnal and diurnal) seizure occurrence, and post-stroke etiology of epilepsy.

Our study highlights the importance of screening, diagnosing, preventing, and managing cognitive impairment associated with epilepsy, as these impairments can worsen over time and have a major impact on learning, professional efficiency and capacity, social integration, and treatment adherence.

Manuscript Submission and Approval Statement

The authors of this manuscript, by submitting it for publication in this journal, certify that it has not been submitted for publication to another journal and has not been previously published. We also certify that its publication is approved by all the authors and that, if accepted, it will not be published elsewhere, including electronically, without the consent of the copyright holder. We further certify that all necessary precautions have been taken to strictly uphold professional confidentiality.

Conflict of Interest Statement

The authors declare no conflicts of interest related to this study.

Statement on the Use of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors did not use AI.

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Authors' Contributions

- **LOMPO Djingri Labodi**: study design, literature review, data collection, study protocol development, data analysis, manuscript writing.
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- **NAPON Christian**: study protocol validation, study supervision.
- **MILLOGO Athanase**: study protocol validation, study supervision.

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