# Cognitive impairments in people with epilepsy in Benin in 2021.

# Les troubles cognitifs chez les personnes épileptiques au Benin en 2021.

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Conflit d'intérêt : Aucun

**Abstract:**

**Objective:** To determine the frequency and factors associated with cognitive impairment in people with epilepsy in Benin in 2021.

**Methods:** This was a multi-centric descriptive and analytical cross-sectional study with data collection over 5 months from April 1 to August 31, 2021, in consenting people with epilepsy aged at least 15 years with diagnosis of epilepsy based on ILAE criteria. Sampling was nonprobability with systematic recruitment of all people with epilepsy meeting the inclusion criteria. Cognitive assessment was performed by a neurologist with the Montreal Cognitive Assessment (MoCA) and cognitive impairment was suspected in patients with a score below 26. Associated factors were determined after multivariate analysis.

**Results:** A total of 70 people with epilepsy were included, 50 of whom were men (sex ratio 2.5). The mean age was 32.4 ± 14.6 years with extremes of 15 and 69 years and the educational level was secondary in 42.9%. The frequency of cognitive impairments was 74.29%, of which 58.57% were mild cognitive impairments, 17.3% moderate and 2.86% severe. All cognitive domains were affected, with respective impairment of semantic memory (96.15%), attention and calculation (63.46%), language rehearsal and verbal fluency (61.54%), abstraction/executive function (59.61%), visual-spatial functions/praxis (53.85%), naming/language (40.38%) and orientation (17.30%). In multivariate analysis, seizure type was the only factor associated with cognitive impairment p=0.031; RP = 2.2006; CI95% [1.0736 - 4.5107].

**Conclusion:** Cognitive impairments are frequent in people with epilepsy. Their systematic screening and management at diagnosis and during the course of the epileptic disease could improve life quality of people with epilepsy.

**Keywords:** Benin–epilepsy-cognitive impairment.

**Résumé:**

**Objectif :** Déterminer la fréquence et les facteurs associés aux troubles cognitifs chez les personnes épileptiques au Bénin en 2021.

**Méthodes :** Il s'agit d'une étude transversale multicentrique descriptive et analytique avec une collecte de données sur 5 mois du 1er avril au 31 août 2021, chez les personnes épileptiques consentantes âgées d'au moins 15 ans avec un diagnostic d'épilepsie selon les critères de l'ILAE. L'échantillonnage était non probabiliste avec un recrutement systématique de toutes les personnes épileptiques répondant aux critères d'inclusion. L'évaluation cognitive a été réalisée par un neurologue à l'aide du Montreal Cognitive Assessment (MoCA) et des troubles cognitifs ont été suspectés chez les patients ayant un score inférieur à 26. Les facteurs associés ont été déterminés après une analyse multivariée.

**Résultats :** Au total, 70 personnes épileptiques ont été incluses, dont 50 hommes (sex-ratio 2,5). L'âge moyen était de 32,4 ± 14,6 ans avec des extrêmes de 15 et 69 ans et le niveau d'éducation était secondaire dans 42,9%. La fréquence des troubles cognitifs était de 74,29%, dont 58,57% étaient des troubles cognitifs légers, 17,3% modérés et 2,86% sévères. Tous les domaines cognitifs étaient touchés, avec des déficiences respectives de la mémoire sémantique (96,15%), de l'attention et du calcul (63,46%), de la répétition du langage et de la fluidité verbale (61,54%), de l'abstraction/fonction exécutive (59,61%), des fonctions visuo-spatiales/praxie (53,85%), de la dénomination/langage (40,38%) et de l'orientation (17,30%). Dans l'analyse multivariée, le type de crise était le seul facteur associé à la déficience cognitive p=0,031 ; RP = 2,2006 ; CI95% [1,0736 - 4,5107].

**Conclusion :** Les troubles cognitifs sont fréquents chez les personnes épileptiques. Leur dépistage et leur prise en charge systématique au moment du diagnostic et au cours de l'évolution de la maladie épileptique pourraient améliorer la qualité de vie des personnes épileptiques.

**Mots-clés :** Bénin -Déficiences cognitives- Epilepsie.

## Introduction:

Cognitive impairment is an integral part of epilepsy definition [1] and has a major impact on social integration, schooling, compliance with treatment, and thus on the patient's quality of life [2]. Long considered as an exclusive complication of structural focal drug-resistant epilepsies and epileptic encephalopathies of children, cognitive impairment is frequent in 30 to 40% of people with epilepsy (PWE) [3]. The mechanism of their occurrence is usually complex and multifactorial [4] and in addition, there are the comorbidities of epilepsy and some hereditary factors such as baseline intelligence quotient [5]. Little work has been done on cognitive impairment in PWE

in Africa and most has focused on cognitive performance in children. In Nigeria, 20% of PWE had mental retardation based on the Wechsler Adult Intelligence Scale [6]. Disorders detected on objective neuropsychological assessment are often more frequent than the subjective complaint expressed by patient [7], recommending systematic screening for cognitive impairment early in the management of epilepsy. This study aimed at evaluating cognitive impairment in PWE in Benin.

## Methods:

This was a multi-centric analytical cross-sectional study with data collection over five-month from April 1 to August 31, 2021 at the departmental university teaching hospital of Parakou (CHUD-BA, in the north of Benin), the university teaching hospital of Cotonou (CNHU-HKM, in the south of Benin) and the departmental hospital of Zou (CHD-Zou, in the center of Benin). All PWE, at least 15 years old, consent or whose parent or guardian had given consent and who were followed in one of the three setting hospitals have been included. The PWE non enrolled in French or unable to answer questions, those with severe aphasia or dysphasia or severe epileptic encephalopathy were excluded. This was a non-probability sampling. The pre-tested questionnaire included general data and data related to the cognitive assessment through the Montreal Cognitive Assessment (MoCA) scale already validated in PWE [8, 9]. Dependent variable was the presence of cognitive impairment defined by a MoCA score < 26. Between 18 and 25 the cognitive impairment was considered mild, moderate between 10 and 17 and severe when the score was below 10 [10]. Independent variables were sociodemographics, history, clinical and therapeutic data on epilepsy. Analysis was performed using Epi info version 7.2.2.6. (2018 CDC Atlanta, MS-DOS). Comparison of proportions was done using the Chi2 test or Fisher's exact test as appropriate, that of means with Student's t-test. A p <0.05 was considered significant, adjusted prevalence ratios (PR) with their 95% confidence intervals (CI95%) were calculated. Approvals from the direction of each hospital were obtained. PWE with identified cognitive impairment were followed up.

## Results:

Of 293 PWE initially identified at the three study centers, 70 were included. The mean age was 32.4 ± 14.6 years with extremes of 15 and 69 years. They were predominantly male 50 (71.4%) with a sex ratio of 2.5. Most of them had secondary education level (42.9%). The main personal history found were head trauma 32.9%, regular alcohol consumption 18.6%, resuscitation at birth 7.1%. (1st and 2nd columns Table). Based on the total score of the MoCA<26 scale; 52 PWE or an overall frequency of 74.3% had cognitive impairment. Among them, 41 (58.57%) had mild cognitive impairment, 9 (12.86%) had moderate cognitive impairment and 2 (2.86%) had severe cognitive impairment. Factors associated with cognitive impairment in bivariate analysis were educational level, occupation, type of seizure, and type of treatment (Table). In multivariate analysis, only seizure type was associated with cognitive impairment in PWE with p-value 0.0312 PR 2.201 CI [1.074 - 4.511].

**Table 1: PWE characteristics and cognitive impairment, Benin 2021.**

| | Total | PWE - CI | | PWE–noCI | | RP | CI95% | p-value |
|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | | | |
| **Gender** | | | | | | | | |
| Male | 50 | 36 | 72.00 | 14 | 28.00 | 1 | - | - |
| Female | 20 | 16 | 80.00 | 4 | 20.00 | 1.1 | 0.84 - 1.47 | 0.492 |
| **Marital status** | | | | | | | | |
| Single | 39 | 30 | 76.92 | 9 | 23.08 | 1.1 | 0.8 - 1.43 | 0.574 |
| Married | 31 | 22 | 70.97 | 9 | 29.03 | 1 | - | - |
| **Educationallevel** | | | | | | | | |
| Primary | 11 | 11 | 100.0 | 0 | 0.00 | 2.0 | 1.27 - 3.17 | 0.005 |
| Secondary | 30 | 21 | 70.00 | 9 | 30.00 | 1.4 | 0.83 - 2.35 | 0.170 |
| Higher | 29 | 9 | 68.97 | 9 | 31.03 | 1 | - | - |
| **Profession** | | | | | | | | |
| Pupil/Student | 20 | 12 | 60.00 | 8 | 40.00 | 1 | - | - |
| Employee | 31 | 22 | 70.97 | 9 | 29.03 | 1.2 | 0.77 - 1.80 | 0.422 |
| Farmer | 3 | 3 | 100.0 | 0 | 0.00 | 1.7 | 1.16 - 2.38 | 0.185 |
| Trader | 8 | 8 | 100.0 | 0 | 0.00 | 1.7 | 1.17 - 2.38 | 0.038 |
| No profession | 8 | 7 | 87.50 | 1 | 12.50 | 1.5 | 0.94 - 2.27 | 0.167 |
| **Past History** | | | | | | | | |
| Head injury | 23 | 19 | 82.61 | 4 | 17.39 | 1.5 | 0.67 - 3.33 | 0.564 |
| Alcohol abuse | | | | | | | | |
| Arterial hypertension | 7 | 6 | 85.71 | 1 | 14.29 | 1.3 | 0.55 - 3.03 | 0.490 |
| Neonatalresuscitation | 5 | 3 | 60.00 | 2 | 40.00 | 1.2 | 0.25 - 5.70 | 0.823 |
| Prematurity | 3 | 3 | 100.0 | 0 | 0.00 | 2.0 | 0.50 - 7.99 | 0.220 |
| Infant febrile seizure | 4 | 4 | 100.0 | 0 | 0.00 | 2.0 | 0.50 - 7.99 | 0.157 |
| Stroke | 3 | 2 | 66.67 | 1 | 33.33 | 1 | - | |
| **Age of onset of epilepsy** | | | | | | | | |
| ≤ 20 years | 44 | 33 | 75.00 | 11 | 25.00 | 1.0 | 0.7 - 1.37 | 0.859 |
| > 20 years | 26 | 19 | 73.08 | 7 | 26.92 | 1 | - | |
| **Type of seizure** | | | | | | | | |
| Focal | 13 | 8 | 61.54 | 5 | 38.46 | 1.2 | 0.58 - 2.62 | 0.588 |
| Generalized | 47 | 39 | 82.98 | 8 | 17.02 | 1.6 | 0.88 - 3.13 | 0.025 |
| Focal and bilateral | 10 | 5 | 50.00 | 5 | 50.00 | 1 | - | |
| **Number of seizures/month** | | | | | | | | |
| 0 | 20 | 12 | 60.00 | 8 | 40.00 | 1 | - | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1-5 | 39 | 32 | 82.05 | 7 | 17.95 | 1.4 | 0.93 - 2.01 | 0.068 |
| >5 | 11 | 8 | 72.73 | 3 | 27.27 | 1.2 | 0.73 - 2.02 | 0.486 |
| **Aetiology of epilepsy** | | | | | | | | |
| Idiopathic | 25 | 19 | 76.00 | 6 | 24.00 | 1.1 | 0.76 - 1.47 | 0.749 |
| Undetermined | 20 | 15 | 75.00 | 5 | 25.00 | 1.0 | 0.73 - 1.48 | 0.823 |
| Symptomatic | 25 | 18 | 72.00 | 7 | 28.00 | 1 | - | |
| **Type of treatment** | | | | | | | | |
| Medical | 34 | 22 | 64.71 | 12 | 35.29 | 1.6 | 0.53 - 4.87 | 0.295 |
| Traditional | 2 | 1 | 50.00 | 1 | 50.00 | 1.3 | 0.22 - 7.22 | 0.809 |
| Medical and traditional | 29 | 27 | 93.10 | 2 | 6.90 | 2.3 | 0.79 - 6.84 | 0.002 |
| Other | 5 | 2 | 40.00 | 3 | 60.00 | 1 | - | |
| **Number of AED** | | | | | 35.29 | | | |
| Monotherapy | 35 | 28 | 80.00 | 7 | 20.00 | 1.1 | 0.8 – 1.40 | 0.637 |
| Polytherapy | 28 | 21 | 75.00 | 7 | 25.00 | 1 | - | |
| **Type of AED** | | | | | | | | |
| Phenobarbital | 17 | 12 | 70.59 | 5 | 29.41 | 0.9 | 0.62 - 1.23 | 0.404 |
| Valproicacid | 36 | 30 | 83.33 | 6 | 16.67 | 1.2 | 0.89 - 1.57 | 0.224 |
| Carbamazepine | 43 | 33 | 76.74 | 10 | 23.26 | 0.9 | 0.73 - 1.26 | 0.774 |
| Levetiracetam | 59 | 45 | 76.27 | 14 | 23.73 | 0.7 | 0.66 -0.88 | 0.273 |
| Ethosuximide | 62 | 48 | 77.42 | 14 | 22.58 | 0.8 | 0.68 - 0.88 | 0.593 |

AED = antiepileptic drug; PWE-CI = person with epilepsy with cognitive impairment; PWE-noCI = person with epilepsy without cognitive impairment; RP = prevalence ratio.

## Discussion

Initially described for the screening of mild cognitive disorders in a population with a minimal level of education, the MoCA is cross-cultural and has been able to find an indication in severe cognitive disorders and particular areas such as elderly subjects and PWE [1, 8, 10]. This scale has the advantage of having been tested in several European, American, and African countries, which gives it an acceptable cross-cultural relationship [1, 8]. It has a satisfactory sensitivity even if the specificity is less good, respectively 87.32% and 50% [10]. The limitation of this study is that the evaluation tool does not allow for the inclusion of subjects who cannot read or write. Thus, a significant number of PWE were not included, creating a selection bias. The overall prevalence of cognitive impairment was 74.3% in our study comparable to that reported by Witt et al. in 2012 (70%) [7] while Phabphal et al. [9] and then Huang et al. [11] had reported lower prevalences of 60% and 36% respectively. These disparities in frequency are certainly related to differences in diagnostic tools and sample sizes. All domains of cognition seem to be affected in our series. Data in the literature on the different types of impairment are quite heterogeneous, but overall it appears that cognitive functions are impaired about different determinants [7, 2]. This impedes learning in young PWE, thus disturbing social and relational life. In our study, cognitive impairment was significantly associated with generalized seizures contrarily to the finding of other [12]. Temporal seizures, recurrent seizures, or seizures on hippocampal sclerosis are most often associated with significant cognitive impairment [13]. Cognitive deficits are also more frequent in lesional or symptomatic epilepsies than in idiopathic or genetic epilepsies, particularly in adults [14], although they may be moderate to severe without a specific pattern of impairment. Our study, due to its low power, could not demonstrate a significant association with empirical factors such as age, level of education, frequency of seizures [14,15]. High educational attainment is widely described in the neuropsychological literature as a protective factor for cognitive deficits [7]. The associated educational level in univariate analysis in our study was not associated after logistic regression just as in the Miller study [16]. It could be largely influenced by our assessment tool which, although adapted to low-level subjects, does not take into account the educational level and age to standardize the interpretation of the final MoCA score like most of the scales assessing intelligence quotients. Antiepileptic treatment also largely influences executive functions in children and adults [12, 13, 17]. In our series the association between conventional antiepileptic drugs and traditional treatment found to be significant in univariate analysis did not emerge in the final model. Tedrus et al. reported that subjects with at least two antiepileptic drugs showed multi-domain cognitive impairment, on semantic verbal fluency and delayed recall [14]. In the Miller et al. 2016 series, for all PWE, taking more antiepileptic drugs was associated with poorer language and visuospatial abilities [16]. Overall, the frequency of cognitive disorders in PWE is high compared to healthy subjects whatever the antiepileptic drug considered. This suggests a reorientation of the care pathway with the creation of memory centers in Benin to focus on the screening and treatment of these epilepsy-related cognitive disorders in our country.

## Conclusion

Cognitive impairment in PWE is frequent in Benin with seizure type as associated factor. A wider study is expected to generalize the data to all PWEs, in order to reduce the burden of epilepsy in this country.

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