

Schooling for Epileptic Children in Ziguinchor

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Abstract

Introduction: Epilepsy is a public health issue in Senegal. It has neurological, cognitive, psychological and social consequences, which motivated this study, the objective of which was to examine the educational pathways of children and adolescents with epilepsy who are being monitored in the neurology departments of the regional hospital and the pediatrics and neurology departments of the Peace hospital in Ziguinchor. **Methodology:** We conducted a retrospective descriptive study during the period from September 2023 to March 2024 in the neurology and pediatrics departments of the Peace Hospital in Ziguinchor and the neurology department of the regional hospital in Ziguinchor. All patients aged 6 to 18 years with epilepsy who were regularly monitored were included. **Results:** We collected data on 47 children with epilepsy. The average age of patients was 11.45 years, ranging from 6 to 17 years. Males were the most represented (63.83%). 76.60% of patients had generalized seizures and 23.40% had partial seizures. Most patients (53.19%) had comorbidities, including behavioral disorders (64%), attention disorders (56%) and language disorders (40%). 19.15% of patients were hospitalized at least once a month due to seizures. In 55.31% of cases, a well-documented epileptic syndrome was noted. Phenobarbital was the most commonly used monotherapy (42.56%). However, 42.5% of patients did not comply with their medication for various reasons, with 6.38% of patients reporting problems with drug availability and 51.06% reporting financial difficulties in obtaining it. We noted persistent seizures in 54.17% of children, who had between 2 and 4 seizures per week. All children were enrolled in school, and 91.48% were enrolled in French schools; 38.3% of patients had experienced seizures at school. School absenteeism related to epilepsy was noted in 2.12% of patients, 4.2% were teased by other pupils and 4.2% were stigmatized at school by teachers and pupils. None of the teachers had received training in emergency procedures for epileptic seizures. 51.1% of parents were reluctant to inform the school of their child's diagnosis. The dropout rate in French schools

was 14.89%. The academic performance of these pupils varied: 5.56% of pupils were considered excellent by their teachers and 27.74% were considered to be performing poorly. Seizures had disappeared in 72.22% of patients with an average time of 17.34 months, ranging from 3 to 84 months. Persistent seizures were noted in 27.78% of patients, with frequencies ranging from one to three seizures per month. **Conclusion:** Epilepsy is a condition that is poorly understood by the general public, with several interpretations that can hinder children's education. Awareness-raising and ongoing training should be continued in order to overcome this lack of understanding of the condition and ensure a better educational future for children with epilepsy.

Keywords

Children with Epilepsy, Schooling, Ziguinchor, Senegal

1. Introduction

Epilepsy is a chronic disease characterized by the occurrence of epileptic seizures. According to the World Health Organization (WHO), 50 million people had epilepsy in 2019. Nearly 80% of those affected lived in low- and middle-income countries [1]. Overall, regardless of age, the prevalence of epilepsy in sub-Saharan Africa varies between 7 and 14.8 per 1000 [2]. The number of people with epilepsy is expected to increase further given the growing proportion of people surviving traumas that often lead to epilepsy, such as obstetric trauma, brain trauma, brain infections and strokes. It is a public health problem in developing countries, particularly in Senegal, where the prevalence is 5 to 10 times higher than in industrialized countries and mainly affects children [3].

Epilepsy has neurological, cognitive, psychological and social consequences and accounts for a significant proportion of the global burden of disease. Around the world, people with epilepsy and their families suffer from stigma and discrimination, and often face significant challenges in terms of education, employment, marriage and reproductive health [4].

Like other conditions, epilepsy is not only a burden for those affected and their families. This complex disease also has an economic impact on society in terms of healthcare needs, premature deaths and lost productivity. More than 50% of children who develop epilepsy will, in the long term, experience difficulties at school, behavioral disorders, psychiatric disorders or a lower quality of life than children of the same age. Studies show significantly lower academic performance and IQ in children with epilepsy [5].

In Senegal, the prevalence of epilepsy was estimated at 14.2 per 1000 in 2001, as in most countries with limited resources [4]. The schooling of children with epilepsy still faces many obstacles and difficulties, whereas for most other chronic childhood conditions, it is well codified and accepted [6].

The school enrolment rate for children with epilepsy in Dakar was 61.3% [7]. Ep-

ilepsy can therefore become an obstacle to intellectual, psychological and emotional development and have an impact on the academic success and overall development of children and adolescents. This is what motivated us to conduct this study, the objective of which was to examine the educational trajectories of children with epilepsy who were being monitored in the neurology departments of the regional hospital and the pediatrics and neurology departments of the Peace Hospital in Ziguinchor.

2. Methodology

This was a retrospective descriptive study conducted between September 2023 and March 2024. All children aged 6 to 18 years who were enrolled in school and regularly receiving epilepsy care at hospitals in Ziguinchor (the neurology and pediatric departments of the Ziguinchor Peace Hospital and the neurology department of the Ziguinchor Regional Hospital) were included. Data were collected from patient records and/or consultation registers. Data entry was performed using Excel 2016, and the data were then exported and analyzed using SPSS version 23.

3. Results

During the study period, 47 patients were enrolled in the various centers.

The average age was 11.45 years, ranging from 6 to 17 years. The most represented age groups were 7 to 11 years (48.94%) and 12 to 18 years (46.81%). Males were the most represented ($n = 30$), with a sex ratio of 1.76. We found evidence of parental consanguinity in 31.9% of cases ($n = 15$). Second-degree consanguinity was the most common (53.33%). In 14 patients, there was a history of familial epilepsy and in the majority of cases, it was the uncle (42.86%), cousin (14.29%) or father (14.29%) (**Table 1**). In our study, eight patients had psychomotor developmental delay (17%), six patients had low birth weight, and 6.38% had kernicterus (**Figure 1**). Postnatal medical history was dominated by head trauma (10.64%), followed by meningitis in 6.38% of cases (**Figure 2**).

The average age at onset of seizures was 5.69 years, ranging from 1 month to 15 years. Thirty-seven patients (78.72%) consulted within the first 48 hours after the initial episode; the remaining patients consulted between 2 weeks and 6 years after the first seizure. We recorded 36 patients with generalized seizures (76.60%) and 11 patients with partial seizures (23.40%). More than half of our patients (53.19%) had comorbidities, including 64% with behavioral disorders, 56% with attention disorders, 12% with sleep disorders, 40% with language disorders (dysarthria, decreased verbal fluency, word-finding difficulties) and 20% with motor disorders (monoparesis and hemiparesis). All of our patients underwent an EEG, with 63.82% presenting with a pathological EEG ($n = 30$). During the study, 26 children (55.31%) had a well-documented epileptic syndrome and 12 children had a well-defined focal epileptic syndrome (**Table 2**).

In our study, 18 patients (38.3%) had undergone brain imaging.

Eleven patients (61.11%) had undergone brain CT scans, of which 36.37% ($n = 4$) showed abnormalities such as cortical-subcortical atrophy alone, schizenceph-

aly + macrocephaly, vascular malformation, and sequelae-like areas of right parieto-temporal hypodensity in one patient. Six patients (12.76%) had undergone cerebral MRI, and no abnormalities were reported. Only one patient had undergone transfontanellar ultrasound, which was normal. In our study, 38.3% had experienced seizures at school ($n = 18$), of which 88.89% had simple seizures and 11.11% had status epilepticus. None of the schools had a medical unit capable of treating children who had seizures at school.

In 2.12% of patients, epilepsy-related school absenteeism was observed. 4.2% were teased by other pupils and 4.2% were stigmatized at school by teachers and pupils.

Monotherapy was the most commonly used treatment, at 89.36% ($n = 42$). Phenyobarbital was the most commonly used monotherapy (42.56%), followed by sodium valproate (36.17%) and carbamazepine (10.64%). We noted that 20 patients did not comply with their medication regimen, representing 42.5%. The most common causes of non-compliance in our study were: availability of medication in 20 patients, forgetfulness on the part of parents in 15 patients, fear of dependence on medication in 5 patients, daytime drowsiness induced by AEs in learners in 9 patients, and reading the side effects in the package leaflets in 5 patients.

The percentage of children who continued their education was 76.59%.

The patients' educational levels varied: 57.5% of the children (18 children) were in primary school, 35% (15 children) were in secondary school, and three children were in high school. In our study, seven children had repeated a year, representing 19.44%.

The academic performance of these pupils varied: two pupils were considered excellent by their teachers; 24 pupils were considered average and nine pupils were considered very poor.

In our study, 59.8% of teachers were able to recognise generalised motor seizures and 6.4% were able to recognise absence seizures. We note that only 6.4% of teachers believed that epilepsy was linked to supernatural phenomena.

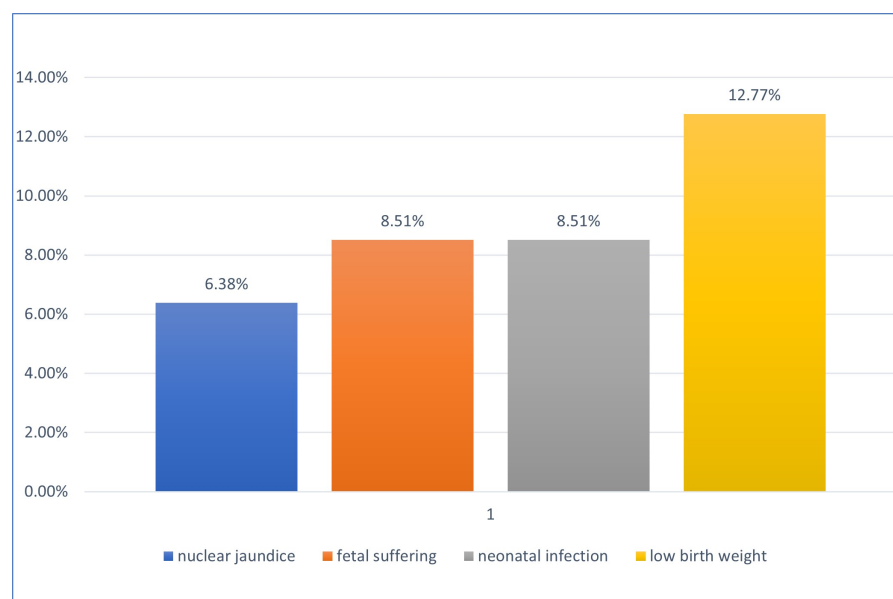
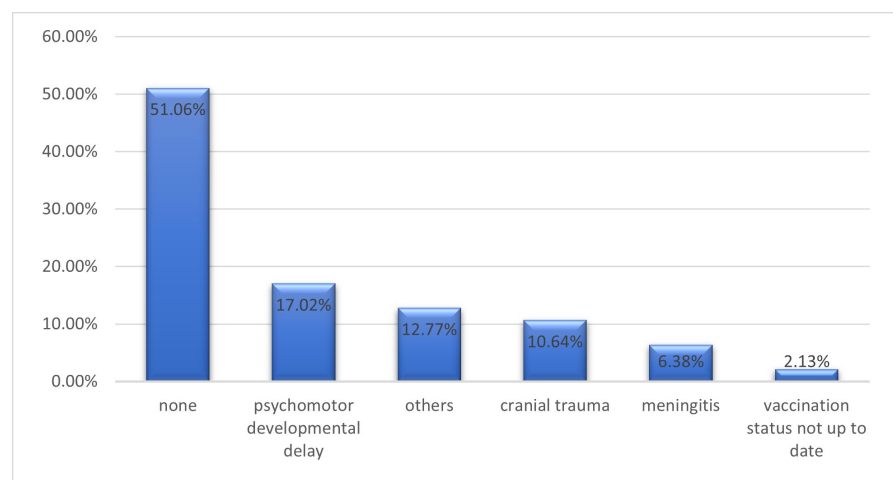
The most common epileptic syndromes were: centro-temporal spike epilepsy (6 children), epilepsy with generalised tonic-clonic seizures alone (9 children), adolescent absence epilepsy (1 child), childhood absence epilepsy (1 patient), frontal lobe epilepsy (1 child) and temporal lobe epilepsy (2 children). Fifteen children did not have a clearly defined epileptic syndrome and five of them had a normal EEG.

Table 1. Distribution of epilepsy according to family member.

Familial Epilepsy	Frequency	Percentages (%)
Uncle	6	42.86
Cousin	2	14.29
Father	2	14.29
Brother	1	7.14
Mother and Cousin	1	7.14
Father et uncle	1	7.14
Sister	1	7.14

Table 2. Distribution according to the location of electrical anomalies.

Anomaly headquarters	Effective	Percentages (%)
Centro-temporal	5	23.80
Fronto-centro-temporal	4	19.04
Fronto-temporal	4	19.04
Fronto-central	3	14.28
Hemispheric suffering	2	9.52
Parieto-temporo-occipital	1	4.76
Temporo-occipital	1	4.76
Parieto-occipital	1	4.76

**Figure 1.** Distribution of patients according to perinatal history.**Figure 2.** Distribution of patients according to other medical history and underlying conditions.

4. Discussion

The limitations of this study are marked by its retrospective nature, recruitment in a hospital setting, the small sample size, the probability of missing data in medical records and the absence of standardized neuropsychological and school assessment.

The epidemiology of epilepsy in developing regions has recently been reviewed by several authors. These studies show some heterogeneity in the distribution of the frequency of this disease. In Senegal, the prevalence of epilepsy was estimated at 14.2 per 1000 in 2001, as in most resource-limited countries [4], and in Mali at 15.6 per 1000 [8], with the specific prevalence in schools estimated at 13 per 1000 [9].

Socio-economic and environmental factors, infectious diseases, particularly parasitic diseases such as neuromalaria, and common consanguinity seem to explain this situation [10]. Epilepsy can affect children of any age. In our study, the average age was 11.45 years, with extremes ranging from 6 to 17 years. The results revealed a male predominance. This finding is consistent with several previous studies conducted in similar contexts. A study conducted by Smith [11] in 2016 on a population of children with epilepsy in Australia reported a similar proportion of boys with a male-to-female ratio of 1.85.

We found that 38.3% of patients had experienced seizures at school. This proportion is relatively high and is consistent with the results of other studies that have also reported a significant prevalence of seizures occurring in school settings among children with epilepsy. Smith *et al.* [12] in 2019 reported a similar prevalence of 35% of seizures at school among children with epilepsy.

These results confirm the importance and frequency of seizures occurring in schools among children with epilepsy, and this lack of healthcare personnel in schools, despite the high incidence of epilepsy in schools, justifies an urgent need to inform teachers about epilepsy and to draw up a personalized action plan (PAP) for each child.

Epilepsy is associated with erroneous and stigmatizing beliefs that scientific advances have failed to change [13]. This lack of knowledge is widespread, not only among the general population, but also in schools. The stigmatization of children with epilepsy is a major obstacle to their education and development. Stigmatization often comes from parents, with many families (52%) believing that children with epilepsy should not attend school [14].

Epilepsy is therefore a criterion for exclusion from a specific learning disorder. However, many children with epilepsy show more significant learning difficulties than would be expected given their intelligence quotient (IQ) [15]. This is linked to more pronounced deficits in working memory, processing speed and inattention.

It is now clear that idiopathic epilepsies have a better prognosis than non-idiopathic epilepsies [16]. However, so-called “benign” epileptic syndromes [17] can be associated with cognitive deficits and behavioral disorders that are important

to identify, otherwise appropriate educational support cannot be provided.

Centrottemporal spike epilepsy (CTSE) is generally mild, with normal neurological and cognitive development, and spontaneous recovery may occur before the age of 15. The six children diagnosed with CTSE in our study were all enrolled in French schools with an average level of education, and none of the pupils had to repeat a year.

This study indicates that children with frontal lobe epilepsy are at higher risk of developing memory deficits than children with absence epilepsy or PTLE [17]. These data from the literature corroborate our findings: among children diagnosed with frontal lobe epilepsy, two had dropped out of school and one had a low academic level.

Temporal lobe epilepsy is associated with a higher frequency of psychopathological disorders (behavioral disorders such as impulsivity, aggression, hyperactivity, personality disorders, anxiety and depression, etc.) [18]. This also contributes to a higher risk of academic difficulties. In our study, three children had temporal lobe epilepsy, including one child who had dropped out of school and two others with average academic results.

All anti-epileptic drugs have an effect on cognitive function. The most characteristic is phenobarbital, which, several decades after its commercialization, was shown to be responsible for an overall decrease in IQ in children of 8.4 points after two years of treatment [19]. Other anti-epileptic drugs such as sodium valproate [20] and carbamazepine [21] have a lesser impact on cognition compared to phenobarbital. However, there are no African studies evaluating the impact of anti-epileptic drugs on children's cognitive development.

In our study, none of the children had undergone neuropsychological assessment at the time of epilepsy diagnosis or during treatment for their condition.

5. Conclusion

Epilepsy is perceived as a factor hindering education and affecting a significant portion of the pediatric population. However, knowledge of the disease remains poor overall, both among patients, children and adolescents, and among their parents and teachers. It hinders intellectual, psychological and emotional development and can have an impact on the academic success and overall development of children and adolescents.

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Author Contributions

All authors have read and approved the final version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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