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ORIGINAL ARTICLE

CHALLENGES IN THE MANAGEMENT OF CHILDHOOD EPILEPSY IN A RURAL AREA WITH ENDEMIC ONCHOCERCIASIS IN CAMEROON

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Keywords

Epilepsy, children, rural setting, onchocerciasis, Cameroon.

ARTICLE HISTORY

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Abstract

Background: Onchocerciasis, an infectious disease due to *Onchocerca volvulus*, is endemic in the Centre region of Cameroon and is thought to be risk factor of epilepsy. This study aimed to describe demographic, clinical, diagnostic and treatment characteristics of pediatric epilepsy in onchocerciasis endemic rural setting in Centre region of Cameroon.

Patients and Methods: In this cross-sectional health facility-based study in the rural locality of Ntui, in the Center Region of Cameroon, 107 consecutive children diagnosed with epilepsy based on clinical findings were recruited from December 2017 to April 2018. Data collected included sociodemographic data, personal and family history, clinical data, paraclinical, diagnostic and therapeutic aspects.

Results: The mean age of children was 12.6 ± 3.8 years. Epilepsy-related family history (84.1%) and parental consanguinity (6.5%) were reported. Generalized tonic-clonic seizures were predominant (82.2%) and clinical diagnosis was done in 96.3% of patients. Out of the 21 children examined by medical doctor, only 23.8% of them were consulted by pediatrician and 3.8% had electroencephalogram results. Carbamazepine (57.5%) was the main anti-epilepsy drug administered as monotherapy. *Onchocerca volvulus* microfilariae were detected in 10.2% (5/49) of children and 19.6% of them received ivermectin.

Conclusion: Four over 5 children with epilepsy in Ntui present GTC seizure with more than half of them been on a monotherapy with carbamazepine. About one over ten children with epilepsy was diagnosed with onchocerciasis. Two over 5 patients consulted a traditional healer.

Introduction

Epilepsy is ranked by the WHO's 2010 Global Burden of Disease study as the second most burdensome neurologic disorder worldwide in terms of disability-adjusted life years.[1] In Cameroon, the department of Mbam-and-Inoubou, located in the Center region, has one of the highest prevalence of epilepsy in the world, estimated at 58%.[2] Data on epilepsy in the pediatric population in general and in rural areas in particular are scarce in our context. The lack of specialists in neurology, the difficulties of access to health facilities as well as the perceptions of the populations are likely to hinder the early diagnosis and the adequate care of children with epilepsy.[3] The objective of this study was to describe the sociodemographic characteristics, the clinical, diagnostic and therapeutic particularities of epilepsies in children in a rural area endemic to *Onchocerca volvulus* in Cameroon.

Patients and methods

A cross-sectional study including children aged from one month to 18 years, with active epilepsy and followed-up at the Ntui Catholic Health Center between December 2017 and April 2018 was conducted. Ntui is a rural area located in the Centre region of Cameroon whose health district is shown in Figure 1. Its population was 25,616 inhabitants in 2005. In this area highly endemic for onchocerciasis, we observe one of the highest prevalence of epilepsy in the world.[2] On the other hand, recent works report a positive correlation between the prevalence of epilepsy and that of onchocerciasis in the same locality.[3] The Catholic Health Center, site of this study, is the reference health facility that takes care of people with epilepsy in this locality with a modest technical platform and little human resources. Care is provided by a team of nurses with basic training in epileptology. These personnel are supported by humanitarian care and research missions (including neurologists) who come sporadically from Italy. From the registry dedicated to follow-up of people with epilepsy, we included all children aged from 1 month to 18 years, presenting with active epilepsy (defined by regular treatment with antiepileptic medications or when the most recent seizure has occurred within the last 5 years).[4] Children with febrile seizures, occasional seizures with or without fever, non-epileptic

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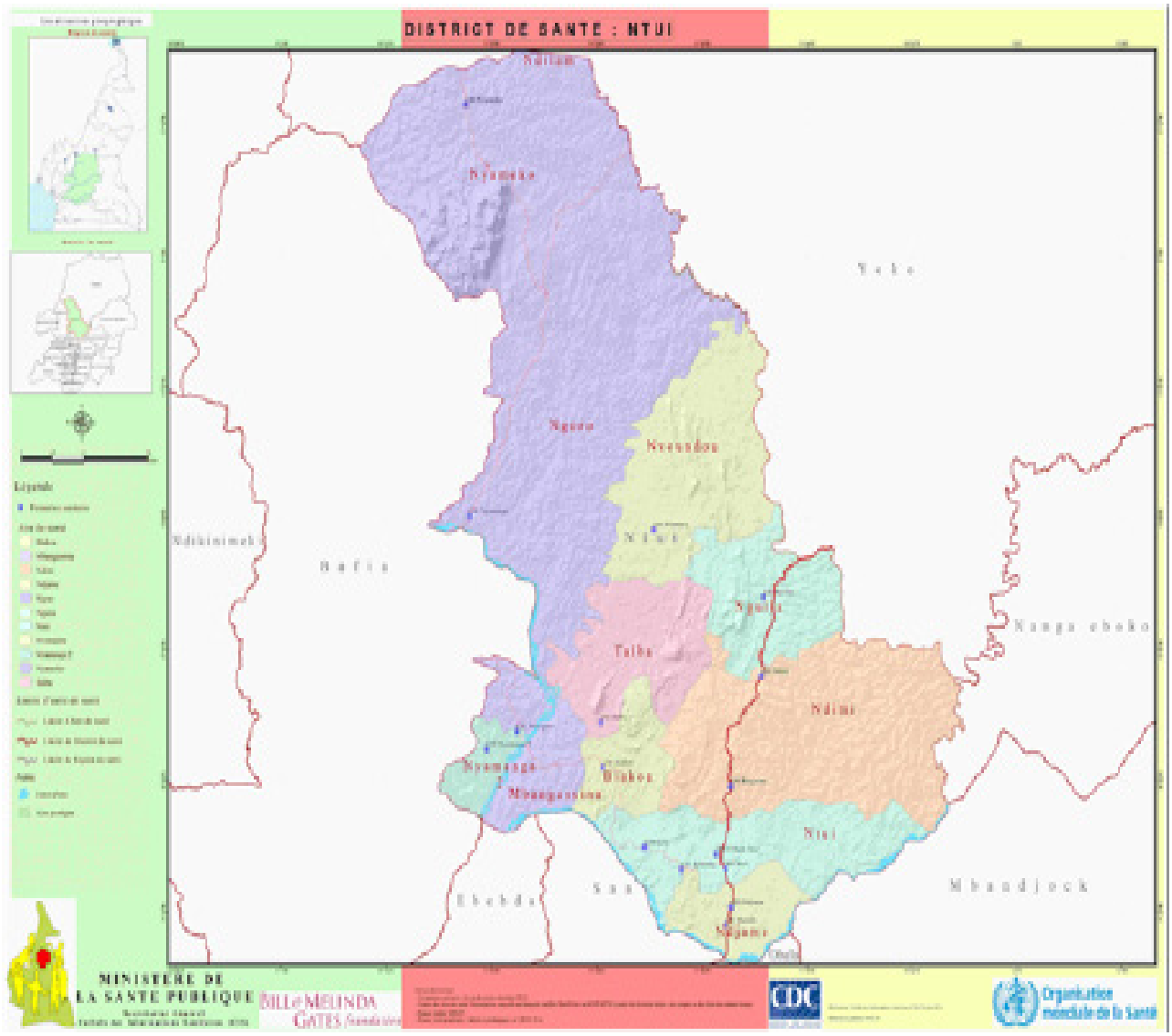
Figure 1. Ntui health district map.



paroxysmal manifestations and children whose parents refused to participate in the study were excluded. For each epileptic patients, data were collected during a medical consultation using a pre-established survey form in the presence of parents. The main variables of interest were sociodemographic data (sex, age, place of residence), personal and family history (consanguinity, epilepsy, birth conditions and adaptation to extra-uterine life), clinical data (weight, height, type of seizures, factors triggering seizures, neurological examination), paraclinical data when available (brain imaging, electroencephalogram, microfilariae test, HIV serology), diagnostic data (type of epilepsy) and therapeutic data (current treatments, drugs, traditional treatment, compliance, tolerance). The quantitative variables were presented in means and standard deviations and the qualitative variables in numbers and percentages. Data entry and validation were done using the Statistical Package for the Social Sciences (SPSS) version 23.0 software. The study obtained ethical clearance N°1224 CEI-UDo/01/2018/T from the institutional ethics committee of the University of Douala.

Results

The Ntui Catholic Center supports some 5,000 patients with active epilepsy in the department. For the study period from December 2017 to April 2018, the center had registered 314 patients with active epilepsy, including 107 children (34.1%). The age varied between 3 and 18 years with an average of 12.6 ± 3.8 years. The female sex was predominant with 61 patients out of 107 (57%) giving a sex ratio of 1.32. The most represented age group was that of 11 to 15 years 50/107 (46.7%). The first seizures occurred before the age of 5 years in 60.8% of patients. The average age of onset of the first seizure crisis was 55.4 ± 38.6 months with extremes of 1 month and 120 months. A history of epilepsy in the nuclear family was found in 90 of the 107 patients (84.1%) with a predominance of epilepsy in the father (61.7% of cases). Inbreeding was found in 7 (6.5%) parents. Children were born in a health facility in 67.3% and delivery was normal in 96.3% of cases. Fifty-eight of the 103 school-aged children (56.3%) did not attend school (Table 1).

Table 1. Distribution of patients according to their past medical history.

Past medical history	n=107	%
Family history		
Epilepsy in the family	90	84.1
Epilepsy in father	66	61.7
Epilepsy in mother	34	31.8
Epilepsy in brothers	73	69.5
Inbreeding	7	6.5
Pregnancy follow-up	90	84.1
Personal history		
Birth at home	35	32.7
Vaginal birth	103	96.3
Prolonged labor	16	15.0
Immediate cry at birth	100	93.5
Resuscitation at birth	8	7.5

Treatment interruption 86/107 (80.4%), emotion 10/107 (9.3%), heat 4/107 (3.7%) and cold 6/107 (5.6%) were factors triggering seizures. Generalized seizures were the most frequent clinical presentation (82.2%) and they were tonic-clonic in 71.3% of cases (Table 2).

Table 2. Distribution of patients according to the type of seizures.

Type of seizures	n=107	%
Generalized seizures		
Tonic-clonic	63	71.3
Tonic	19	21.8
Atonic	4	4.6
Absence	2	2.3
Focal seizures		
Altered consciousness	14	73.7
Normal consciousness	5	26.3

The diagnosis of epilepsy was made solely on the basis of clinical arguments in 96.3% of patients. The initial diagnosis of epilepsy had been made by a nurse, a general practitioner or a pediatrician in 80.4%, 14.9% and 4.7% of patients respectively.

Electroencephalogram was performed in 4 patients (3.8%) of patients while 49 patients (45.8%) had microfilariae test with 10.2% positive to Onchocerca volvulus (those 5 children experienced pruritus and scratching lesions on the skin). HIV serology was negative in 45 (42.5%) of patients who performed this serology. Only one patient (0.9%) had been able to perform a brain CT-Scan (Table 3).

Table 3. Distribution of patients according to the workup carried out.

Paraclinical workup realised	n=107	%
Brain CT Scan	1	0.9
EEG (results non available)	4	3.8
HIV négative	45	42.5
Microfilaria test realised	49	45.8
Microfilaria test positive for Onchocerca volvulus (n=49)	5	10.2

EEG: Electroencephalogram, VIH: Human Immunodeficiency Virus.

The antiepileptic drugs used in monotherapy were: carbamazepine for 61 patients (57.5%), phenobarbital for 20 patients (18.9%) and sodium valproate for 4 patients (3.8%). Bitherapy associated carbamazepine and phenobarbital, sodium valproate and phenobarbital or sodium valproate with carbamazepine respectively in 11.3%, 6.6% and 1.9% of cases. Parents declared having visited traditional healers in 40.2% of cases. Twenty-one patients (19.6%) had received ivermectin as part of systematic deworming campaigns conducted by the National Onchocerciasis Control Program in the country (Table 4).

Table 4. Distribution of patients according to the type of treatment.

Variable	n=107	%
Administration of ivermectine		
Yes	21	19.6
No	86	80.4
Modality of treatment		
Medication	64	59.8
HIV negative	45	42.5
Traditional	1	0.9
Successive	42	39.3
Type of traditional treatment		
Oral route	42	97.7
Applyed to the skin	2	4.8
Scarification	25	58.1
Amulet	1	2.4
Baths	35	81.4
Prayers and incantations	11	25.6
Antiepileptic medications		
Carbamazepine	61	57.5
Phenobarbital	20	18.9
Sodium Valproate	4	3.8
Carbamazepine + Phenobarbital	12	11.3
Sodium Valproate + Phenobarbital	7	6.6
Sodium Valproate + Carbamazepine	2	1.9

Discussion

This study aimed to describe the clinical, diagnostic and therapeutic features of children with epilepsy in a rural locality where onchocerciasis is endemic. The sample was composed of 107 children whose age ranged from 3 to 18 years with an average of 12.6 ± 3.1 years. The female sex was the most represented with a sex ratio of 1.3. Bourrous et al. out of 592 children whose age varied between 1 month and 15 years, followed for epilepsy at the University Hospital of Marrakech in 2010, found an average age of 6 years and 7 months and a sex ratio of 1.2 in favor of the male sex.[5] Gams et al. out of 218 children whose age varied from 0 to 16 years at the Yaoundé Gynaeco-Obstetric and Pediatric Hospital in 2016, had an average age of 8 years and a sex ratio of 1.3 in favor of boys.[6] In this agricultural rural area and during the the cocoa harvest season, the boys constitute an important workforce, this factor could prevent them from attending their medical appointments at the health center.

Epilepsy is described as being a factor favoring school absenteeism.[7] In the present study, 56.3% of school-aged children were out of school. This rate is higher than that found in India by Deb et al. in 2002 and by Ndiaye et al. in Senegal in 2008 which found respectively that 30% and 15% of school-age children with epilepsy were not attending school because of seizures [7,8]. This low school attendance rate could be explained by the concern of parents to protect their children from the dangers that may arise during seizures by keeping them at home and by the reluctance of teachers to admit a child with epilepsy to the class. On the other hand, the occurrence of seizures in the school environment is very anxiety-provoking for those around and could lead to the stigmatization of the child and the whole family.

A history of inbreeding was found in 6.5% of the children. This rate is lower than that found by Wakamoto et al. in 2000 in Japan which was 11.6% or by Asadi-Pooya et al. in 2005 in Iran by 54.1%.[9,10] This low proportion of inbreeding in our series could be explained by the fact that marriages within the same family are not allowed in the local habits.

From a clinical point of view, as in the majority of studies carried out in countries with limited resources, generalized seizures were the most frequent clinical presentation with 82.2%. These results are comparable to those of Kaputu et al. in 2016, of Bourrous et al. in 2010 in Morocco and those of Adoukounou et al. in 2015 in Benin who found generalized seizures respectively in 79%, 70.5% and 92.7% of cases.[5,11,12]

The first seizures occurred before the age of 5 years in 60.8% of the patients in our study. This was similar in the study by Gams et al. at the Yaoundé Gynaeco-Obstetric and Pediatric Hospital in 2016, which reported an age of onset of seizures of less than 5 years in 59% of cases.[6]

The diagnosis was made solely on the basis of clinical arguments in 96.3% of children. Four of the 107 patients (3.8%) had performed an electroencephalogram and one patient (0.9%) had undergone a cerebral computed tomography. The diagnosis of epilepsy had been made by a nurse, a general practitioner or a pediatrician respectively in 80.4%, 14.9% and 4.7% of cases. The lack of qualified personnel for the care of children with epilepsy and the limited access to paraclinical examinations are well known and described in countries with limited resources, this shortage has even been reported to be greater in rural areas [13,14]. There was no permanent pediatrician, neuropediatrician or neurologist in the locality of Ntui and nurses were responsible for care of patients. In Cameroon, in 2022, with a population of approximately 10 million children under the age of 15, the country has 6 neuropediatricians, 4 of whom practice in Yaoundé and 2 in Douala, cities located respectively 83km and 335 km from Ntui. In this context, access to a qualified healthcare professional is very difficult.

Although being in an area endemic for onchocerciasis, only 49 of the 107 patients (45.8%) had a test for Onchocerca volvulus microfilaria, of which 5 (10.2%) were positive. Due to the design and the small size of our sample of our study, we could not establish a correlation between epilepsy and onchocerciasis. Kaiser et al. in 1996 in Uganda found a positive correlation between the prevalence of epilepsy and onchocerciasis.[14] Furthermore, Boussinesq et al. in 2002 found a correlation between onchocerciasis and epilepsy in the Mbam valley.[15]

Concerning care, the use of alternative treatments and in particular the intervention of traditional healers in the care of epilepsy is frequent because of various beliefs and social representations. In this study we found that 40.2% of patients had visited a traditional healer. This result is close to that of Njamnshi et al. who, in 2009, found that 30.2% of patients with epilepsy in South West Cameroon had used a traditional healer.[16]

Regarding antiepileptic drugs (AED), 80% of patients were treated with monotherapy and 20% with dual therapy. In monotherapy, carbamazepine was the drug most often prescribed with 57.5% of cases. This contrasts with the results of Ndiaye et al. in Senegal in 2008 who rather found sodium valproate as the antiepileptic drug most often prescribed as monotherapy (63.8%).[7] This difference could be explained by the unavailability of sodium valproate and its higher cost at the Ntui Catholic Health Center, forcing caregivers to use carbamazepine, the availability of which is more regular due to the subsidy of this antiepileptic drug as part of care programs for patients with epilepsy.

Conclusion

In the rural locality of Ntui with most of care delivered by nurses, over 4 on 5 children with epilepsy presented generalized tonic-clonic seizures. The diagnosis was essentially clinical. Carbamazepine as monotherapy was the most frequently used antiepileptic drug. In the therapeutic itinerary, the families went to the traditional healers. One over 10 children with epilepsy presented a positive skin test for Onchocerca volvulus. Children with epilepsy have specific needs requiring holistic care. Improving human resources with the regular arrival of a pediatrician and a neurologist would improve care. The availability of diagnostic means (EEG and cerebral scanner) would improve the etiological diagnosis.

Contributor Statement
Research design and implementation: DE, DCKK, BTT, YMN;

Results analysis: DE, BTT, DNN;

Manuscript writing: DE, BTT, DCKK;

Manuscript review for intellectual content: DE, DCKK, BTT, DNN, YMN.

All authors approved the final version of the manuscript.

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