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Review Article

Epidemiological, Clinical, and Electroencephalographic Profile of Epileptic Children with ADHD at LNSM Antsakaviro, Antananarivo, Madagascar

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Abstract

Introduction: ADHD is a neurobiological disorder that constitutes a public health problem. Our aim was to establish the epidemiological, clinical, and electroencephalographic profile of patients with epilepsy and ADHD at LNSM Antsakaviro.

Methods: This was a retrospective, descriptive, and cross-sectional study based on consecutive patient records over three months from February 1, 2016, to April 30, 2016.

Results: We included 53 patients, with a predominance in the 3-6 years age group. The median age was 6.43 years, and the sex ratio was 1.789. ADHD was especially present in children with idiopathic epilepsy (60.37%). Generalized tonic-clonic seizures (n = 21; 39.62%) were associated with a higher prevalence of ADHD, with the hyperactive subtype being predominant (n = 12). In 47.16% of cases (n = 25), no epileptiform activity was observed on awake EEG recordings; focal temporal abnormalities were found in 57.14% (n = 4) of focal cases. Forty-seven patients receiving sodium valproate presented with the hyperactive-impulsive subtype of ADHD (n = 24). No patient received treatment for ADHD.

Conclusion: The diagnosis and management of ADHD are insufficiently addressed. Establishing a dedicated ADHD care pathway and training qualified professionals are essential for improving care in Madagascar.

Keywords: Child; Electroencephalography; Epilepsy; Madagascar

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a neurobiological disorder characterized by inappropriate levels of inattention, impulsivity, and hyperactivity for the child's age and intellectual development [1]. Symptoms must be present in at least two different environments (e.g., school and home) [2]. Clinical studies involving children with epilepsy report ADHD symptoms in 8% to 77% of cases, depending on study design and diagnostic criteria [3,4]. Epilepsy in children with ADHD also appears to be more severe than in those without. ADHD is a major public health concern due to its long-term effects on individuals and families, and its burden on the judicial, educational, and healthcare systems [5,6]. This

study aims to describe the epidemiological, clinical, and electroencephalographic characteristics of epileptic patients diagnosed with ADHD at the Neuroscience and Mental Health Laboratory (LNSM) of Antsakaviro, Antananarivo, Madagascar.

Methodology

This retrospective, descriptive study was conducted to establish the epidemiological, clinical, and electroencephalographic profile of patients with epilepsy and ADHD at the Antsakaviro Neuroscience and Mental Health Laboratory. Participants were selected from the laboratory's database between February 1 and April 30, 2016, which included 1,253 medical records. The most recent EEG report was reviewed for each case. Inclusion criteria were age 3 to 12 years, diagnosis of epilepsy, diagnosis of ADHD using the Copeland Child Behavior Checklist, EEG monitoring, and antiepileptic treatment for at least six months. Incomplete records were excluded.

Data collected included absolute and relative frequencies (age, sex), clinical characteristics (ADHD type, severity), EEG findings, and epilepsy type and treatment. Data were entered using a structured questionnaire and analyzed with Microsoft Excel 2010. Results are reported as absolute numbers, percentages, and means.

Results

During the study period, 1,253 patients were recorded (681 males, 572 females). Among them, 53 patients had both epilepsy and ADHD and underwent EEG. Most were aged 3-6 years (n=33; 62.26%), with a median age of 6.43 years and a male-to-female ratio of 1.789.

Generalized tonic-clonic seizures were reported in 39.62% (n = 21), with a predominance of the hyperactive ADHD subtype (n = 12). ADHD was more common in idiopathic epilepsy in 60.37% (n = 32). EEG findings revealed no epileptiform activity in 47.16% (n = 25). Among those with focal activity (n = 7), 57.14% (n = 4) had temporal abnormalities. Sodium valproate was the most common treatment (n = 47), with 24 presenting the hyperactive-impulsive ADHD subtype. No patient received treatment for ADHD. The findings of our study are summarized in table 1.

Discussion

This study was part of a broader research effort examining the relationship between epilepsy and ADHD. We focused on describing the association between epilepsy type and ADHD subtype among patients diagnosed with both conditions.

During the three-month period, we identified 53 cases among 1,253 patients (4.22%). Socanski., *et al.* (2013) found that 2.3% of children aged 6-12 years with ADHD had epilepsy [7]. Davis., *et al.* (2010) reported epilepsy in 2.2% of children with ADHD and 0.8% in controls [8]. Our findings are consistent despite the brief study period. The Antsakaviro Neuroscience Laboratory receives about 400 epileptic patients monthly, allowing for a sizable sample.

Most patients were aged 3-6 years, with a median age of 6.43 years and a male predominance (sex ratio 1.789). Dunn., *et al.* (2003) similarly observed male predominance in epileptic children aged 9-14 [3]. The choice of assessment tool, such as the Copeland checklist, may influence ADHD detection, as it relies on parental and teacher reports.

Generalized tonic-clonic seizures were associated with more ADHD cases, particularly the hyperactive subtype. This contrasts with Dunn., *et al.* (2003), who found complex partial seizures and inattentive ADHD subtype more common [3]. Early-onset epilepsy, higher seizure frequency, and severity may correlate with ADHD. Clinicians should consider ADHD screening in epileptic children and vice versa.

ADHD was more frequent in idiopathic epilepsy (60.37%), followed by symptomatic (18.86%) and cryptogenic (16.98%). Waaler., *et al.* (2000) found symptomatic epilepsy most common (46.7%) [9], while Socanski., *et al.* (2013) found cryptogenic epilepsy predominant (42.9%) [7]. The younger age range in our study may explain the difference.

		ADHD type (N=53)		
	N (%)	Inattentive	Hyperactive	Combined
Age group (yr)				
3 à 6	33 (62.26)			
7 à 9	13 (24.52)			
10 à 12	7 (13.20)			
Sex				
Male	34 (64.15)			
Female	19 (35.84)			
Seizure type				
Generalized tonic-clonic	21 (39.62)	2	12	7
Absence	12 (22.64)	3	4	5
Simple partial	1 (1.88)	0	0	1
Complex partial	1 (1.88)	0	0	1
Secondary generalization	3 (5.66)	0	3	0
Unclassified	15 (28.30)	3	7	5
Epilepsy type				
Idiopathic	32 (60.37)	3	15	14
Cryptogenic	9 (16.98)	3	4	2
Symptomatic	10 (18.86)	2	5	3
EEG findings				
No epileptiform activity	25 (47.16)	5	13	7
Focal epileptiform activity	7 (13.20)	1	4	2
Frontal	2 (3.77)	0	1	1
Temporal	4 (7.54)	1	2	1
Central	0 (0.00)	0	0	0
Parietal	1 (1.88)	0	1	0
Occipital	0 (0.00)	0	0	0
Generalized epileptiform activity	21 (39.62)	3	8	10
Antiepileptic drug				
Sodium valproate	47 (88.67)	6	24	17
Phenobarbital	2 (3.77)	1	0	1
Carbamazepine	1 (1.88)	1	0	0
Levetiracetam	1 (1.88)	0	0	1
Combination therapy	0 (0.00)	0	0	0
No treatment	2 (3.77)	0	1	1

Table 1: Epidemiological, clinical, electroencephalographic and antiepileptic drug therapy characteristics of children with comorbid ADHD and epilepsy seen at LNSM Antsakaviro, February 1 to April 30, 2016 (N = 53).

EEG findings showed no epileptiform activity in 47.16%. Generalized abnormalities were seen in 39.62%, and focal abnormalities in 13.20%, mostly temporal. Doncel., *et al.* (2014) noted a left centrotemporal spike in a non-epileptic ADHD child [10]. Dunn., *et al.* (2003) found generalized and temporal focal anomalies in epileptic ADHD children [3]. EEG abnormalities in ADHD are still of unclear clinical significance.

Sodium valproate was used in 47 patients; 24 exhibited hyperactive-impulsive ADHD. None received ADHD treatment. Dunn., *et al.* (2003) reported similar findings [3]. Bourgeois., *et al.* (2004) noted that barbiturates, benzodiazepines, and levetiracetam may worsen cognitive symptoms [11]. The co-occurrence of epilepsy and ADHD complicates diagnosis and care. ADHD medications may improve symptoms, even in epileptic patients. Establishing a care pathway and training clinicians is vital in Madagascar.

Conclusion

In this cohort, children with epilepsy and comorbid ADHD were predominantly male with a median age of 6.43 years. Most had idiopathic epilepsy without epileptiform abnormalities and were treated with sodium valproate. The hyperactive-impulsive ADHD subtype predominated. Multicenter studies are warranted to further characterize this clinical profile in the Malagasy population.

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