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## ORIGINAL ARTICLE

# Study of Mental Health, Emotional, and Behavioral Aspect in Childhood Epilepsy

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### Abstract

**Background:** Epilepsy and psychiatric comorbidities are in a complex relationship, which can be evidenced by the relatively high prevalence of comorbidities and the existence of a bidirectional relationship that puts not only people with epilepsy, but also patients with primary epileptic disorders at increased risk for developing psychiatric disorders exposes mental disorders diseases, the risk of developing epilepsy is higher.

**Aim:** To investigate the impact of epilepsy on the mental health, emotional, and behavioral aspects of children with epilepsy.

**Patients and methods:** Cross-sectional study of 100 children aged 6–18 years diagnosed with epilepsy recruited from 175 children currently suffering from epilepsy at the Department of Neurology, Al-Azhar University, Assiut.

**Results:** In this study, 100 children with epilepsy, a mean age of 48 males and 52 females, were presented to their caregivers, most living in rural areas with moderate education, 69 had generalized tonic–clonic seizures, seven had absence seizures and 24 had partial seizures, 74 were taking more than one antiseizure drug, with an average intelligence quotient (IQ). The prevalence of emotional and behavioral problems was significantly associated with age at first seizure, type of seizure, number of antiseizure drugs taken, and IQ score. A significant correlation was observed in children with attention-deficit hyperactivity disorder and child behavioral checklist- Diagnostic and Statistical Manual of Mental Disorders (CBCL-DSM)-oriented scales. Emotional and behavioral problems were more common in children between 6 and 10 years of age at onset and borderline IQ scores.

**Conclusion:** Epilepsy in children aged 6–18 years had a significant impact on emotional, behavioral, and mental health.

**Keywords:** Antiepileptic drug, CBCL score, Childhood, Epilepsy, Intelligence quotient score, Social competence

## 1. Introduction

Epilepsy is a chronic neurological disorder characterized by recurrent seizures, affecting more than 50 million people worldwide, 80 % of whom live in low-income and middle-income countries.<sup>1</sup> It is estimated that two-thirds of seizures begin in old age onset is ~5–6 years.<sup>2</sup> The overall lifetime prevalence of epilepsy is estimated at 7.60 per capita in economically disadvantaged countries.<sup>3</sup> With a high prevalence in Egypt of March 9, 1000 and a crude lifetime prevalence of epilepsy of 12.67/1000.<sup>4</sup> And the incidence was 1.5/1000.<sup>5</sup> Childhood epilepsy is a chronic, relapsing disorder characterized by unprovoked seizures that significantly impair brain growth and development. It can

disrupt ongoing neurodevelopmental processes and impair a child's intellectual and cognitive functioning, with tremendous cognitive, behavioral, and psychosocial consequences.<sup>6</sup> Childhood epilepsy is associated with several comorbidities and challenges.<sup>7</sup> Several risk factors are associated with emotional and behavioral comorbidities in children with epilepsy, including seizure type, duration, frequency, age of seizure, lateral epileptic focus, genetic predisposition, sex, and presence of structural seizure lesions and adverse events associated with antiepileptic drugs (AEDs); start, adjust dose, or stop an AED; and use of various medications.<sup>8</sup> Reported emotional and behavioral problems in children with epilepsy include symptoms of attention-deficit hyperactivity disorder, symptoms of

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depression, and anxiety.<sup>9</sup> Symptoms of psychosis have also been reported, although this is more common in children with epilepsy case was epilepsy. In children it rarely occurs.<sup>10</sup>

Therefore, this study aim to determine the impact of epilepsy on mental health, emotional, and behavioral aspect of children with epilepsy.

## 2. Patients and methods

The study was conducted from early September 2021 to late February 2023 at the Department of Neurology, Al-Azhar University, Assiut, Egypt. The Ethics Committee approved the study conducted by Al-Azhar University School of Medicine and Assiut (MSC/AZ.AST./NAP020/65/199/9/2021). Written consent was obtained from the participants. A cross-sectional study enrolled 100 children diagnosed with International League Against Epilepsy accompanied by the parents of a patient who fully met the following criteria, while 75 epilepsy patients who met the other criteria were excluded from the study. Mentally deficient, 15 suffered from migraine with aura, 16 suffered from extrapyramidal disorders, six suffered a stroke, and for the others, their relatives were unavailable during the study or refused to inquire. Children with known epilepsy between the ages of 6 and 18 who are accompanied by a parent of a patient and meet all criteria for the International League Against Epilepsy classification of epilepsy. Appendix I has been added. Children with an epilepsy-like illness.<sup>11</sup> Children with epilepsy who were mentally retarded or had other conditions, patients with brain MRI or computed tomography scan abnormalities who were not attended by a primary caregiver, and patients who refused consent were excluded. All patients underwent the following evaluations: complete medical, physical, and neurological history and examination, detailed history of epilepsy, Appendix II.<sup>12</sup> Laboratory tests: including (complete blood count, renal function test, liver test, thyroid function test, and random blood glucose test to detect conditions leading to epilepsy or may impair perception). Digital electroencephalogram for 1 h, renewable. MRI or computed tomography scan of the brain to rule out structural abnormalities. Psychometric assessment: includes A: Stanford and Binet Fourth Edition Intelligence Quotient (IQ) Test (SB4)/Arabic Version. B: behavior checklist for school-age children, Parent Form.

### 2.1. Statistical analysis

Statistical analysis was done with Windows, version 25.0. (IBM Corp., Armonk, New York, USA).

The data were presented and the appropriate analysis performed according to the type of data obtained for each parameter. Descriptive statistics are the SD of numeric data. Frequency and percentage of non-numeric data. Student's *t*-test was used to assess the statistical significance of the difference between the means of the two study groups.

## 3. Results

Generalized tonic clonic (GTC) is the most common form of epilepsy in all age groups, with a higher incidence in women. However, focal epilepsy is common in males and more than half of hairy boys live in rural areas. And most children had one or more seizures a day. About two-thirds of children require two or more AEDs. With an average IQ score. Significant association between normal and borderline children and clinically diagnosed somatic disorders, noncompliance with rules and attention problems. There is no significant correlation between the different types of epilepsy and the eight CBCL syndromes. There is no significant association between different types of epilepsy and problems with CBCL syndrome. Children with attention-deficit hyperactivity disorder had a significant correlation with the CBCL-DSM-oriented scales. There is no significant correlation between epilepsy types and CBCL-DSM-oriented scaling problems. Significant association between normal and borderline child and clinically diagnosed social and academic skills. Significant association between epilepsy types and CBCL ability scales excluding social problems. Children with the syndrome are more common on all CBCL scales. Children who had partial seizures

Table 1. Sociodemographic characteristics of studied group.

Demographic data	Studied children (N = 100) [n (%)]
Age groups	
6–12 years	59 (59)
>12–15 years	17 (17)
>15–18 years	24 (24)
Sex	
Male	48 (48)
Female	52 (52)
Primary caregiver	
Both parents	69 (69)
Father	11 (11)
Mother	20 (20)
Level of education of primary caregiver	
High	11 (11)
Medium	48 (48)
Low	41 (41)
Residence	
Rural	60 (60)
Urban	40 (40)

Table 2. Clinical characteristics of the studied group.

	Studied children (N = 100) [n (%)]
Age at first seizure	
2–5 years	32 (32)
6–10 years	66 (66)
More than 10 years	2 (2)
Frequency of seizures	
Once or more daily	50 (50)
Once or more monthly but not daily	24 (24)
Occur with irregular frequency	13 (13)
None in the last 1 year	13 (13)
Type of seizure	
GTC	69 (69)
Focal	24 (24)
Absence	7 (7)
Number of antiepileptic drugs	
One	25 (25)
Two or more than two	74 (74)
None	1 (1)
IQ score	
Average (90–109)	64 (64)
Low average (80–89)	25 (25)
Borderline (70–79)	11 (11)

IQ, intelligence quotient.

#### 4. Discussion

In the present study, the mean age at onset of seizures was  $6.21 \pm 1.75$  years, while the median was 6 years, with a range of 2–11 years. Sixty-six percent of children had their first seizure between the ages of 6 and 10. Half (50 %) of the children who attended the epilepsy follow-up experienced one or more seizures per day. Twenty-four percent of them had seizures once or more a month, but not every day. Thirteen percent of children had seizures of irregular frequency and 13 % of children were seizure free in the past year.

In addition, generalized tonic–clonic seizures were reported in 69 % of children, partial seizures in 24 %, and nonconvulsive seizures in 7 % of children. Twenty-five (25 %) children used only one type of AED, 74 % used more than one, and 1 % did not take any. Regarding IQ scores, most children (64 %) reported an average IQ score, 25 % of them were below average, and 11 % were borderline.

Table 3. Distribution of CBCL syndrome scores in children with epilepsy.

Problems	Studied children (N = 100)			
	Syndrome scale		Clinical diagnosed	
	Normal [n (%)]	Borderline [n (%)]	n (%)	P value
Anxiety and depression	80 (80)	12 (12)	8 (8)	0.14
Withdrawn	80 (80)	14 (14)	6 (6)	0.14
Somatic complaints	70 (70)	26 (26)	4 (4)	0.04
Social problems	81 (81)	11 (11)	8 (8)	0.15
Thoughts problems	82 (82)	15 (15)	3 (3)	0.16
Attention problems	77 (77)	11 (11)	12 (12)	0.05
Rule-breaking behavior	73 (73)	24 (24)	3 (3)	0.04
Aggressive behavior	82 (82)	7 (7)	11 (11)	0.16

and were not taking antiseizure drugs had fewer emotional and behavioral problems. Whereas in children aged 6–10 it increased during the first seizure and in children with borderline IQ scores (Tables 1–11).

According to the recent study by Mohamed et al.<sup>13</sup> the majority of the 146 (78.1 %) patients had their first seizure after more than 5 years, while 41 (21.9 %) had their first seizure before 5 years. One hundred fifty-two (81.2 %) patients had

Table 4. Relations between eight CBCL syndrome problems according to types of epilepsy.

Syndrome scale problems	Types of epilepsy [n (%)]				P value
	Clinically diagnosed	GTC	Focal	Absence	
Anxiety and depression	8	5 (62.5)	1 (12.5)	2 (25)	0.41
Withdrawn	6	3 (50)	2 (33.4)	1 (16.6)	0.24
Somatic complaints	4	3 (75)	1 (25)	0	0.62
Social problems	8	5 (62.5)	3 (37.5)	0	0.06
Thoughts problems	3	3 (100)	0	0	0.59
Attention problems	12	11 (91.7)	0	1 (8.3)	0.25
Rule-breaking behavior	3	2 (66.6)	0	1 (33.4)	0.40
Aggressive behavior	11	4 (81.9)	0	2 (18.2)	0.14

Table 5. Relations between internalization, externalization, and total problems according to types of epilepsy.

Syndrome scale problems	Studied patients (N = 100)		Subtypes of epilepsy			P value
	Normal	Abnormal	GTC (N = 69) [n (%)]	Focal (N = 24) [n (%)]	Absence (N = 7) [n (%)]	
Internalization (withdrawn, somatic complaints, and anxious/depressed)	82	18	11 (15.9)	4 (16.6)	3 (42.8)	0.211
Externalization (aggressive behavior and delinquent behavior)	86	14	11 (15.9)	0	3 (42.8)	0.119
Other problems (thoughts and attention problems)	100	0	0	0	0	–

Table 6. Distribution of CBCL-DSM Oriented scales in studied group.

CBCL-DSM oriented scales	Studied children (N = 100)				
	Normal [n (%)]	Borderline [n (%)]	Clinical diagnosed n (%)		P value
Affective (mood) problems	92 (92)	3 (3)	5 (5)		
Anxiety problems	87 (87)	5 (5)	8 (8)		0.22
Somatic problems	87 (87)	10 (10)	3 (3)		0.22
ADHD	78 (78)	9 (9)	13 (13)		0.05
Oppositional defiant problems	84 (84)	5 (5)	11 (11)		0.21
Conduct problems	81 (81)	16 (16)	3 (3)		0.1

ADHD, attention-deficit hyperactivity disorder.

Table 7. Relations between CBCL-DSM oriented scales problems according to types of epilepsy.

CBCL-DSM oriented scales	Types of epilepsy [n (%)]				P value
	Total number	GTC	Focal	Absence	
Affective (mood) problems	5	2 (40)	2 (40)	1 (20)	0.11
Anxiety problems	8	5 (62.5)	1 (12.5)	2 (25)	0.41
Somatic problems	3	2 (66.7)	1 (33.3)	0	0.50
ADHD	13	12 (92.3)	0	1 (7.7)	0.21
Oppositional defiant problems	10	8 (80)	0	2 (20)	0.28
Conduct problems	4	2 (50)	1 (25)	1 (25)	0.46

ADHD, attention-deficit hyperactivity disorder.

Table 8. Distribution of children regarding CBCL-competence scales.

CBCL competence scales	Studied children (N = 100) [n (%)]			P value
	Normal	Borderline clinical	Clinical diagnosed	
Activities	77 (77)	16 (16)	7 (7)	0.23
Social	73 (73)	18 (18)	9 (9)	0.03
School	67 (67)	15 (15)	18 (18)	0.002
Total competence scales	78 (78)	0	22 (22)	0.168

Table 9. Relations between CBCL competence scales problems according to types of epilepsy.

CBCL-competence scales	Types of epilepsy [n (%)]				P value
	Total number	GTC	Focal	Absence	
Activities	7	4 (57.1)	0	3 (42.9)	0.014
Social	9	8 (88.9)	1 (11.1)	0	0.467
School	13	8 (61.5)	0	5 (38.5)	0.001
Total competence scales	21	16 (76.2)	0	5 (23.8)	0.009

Table 10. Distribution of child behavior checklist syndrome in children with epilepsy regarding to prevalence in each child.

CBCL	Total number	Children have one syndrome	Children have two syndrome	Children have more than two syndromes
CBCL eight syndrome	53	33	15	5
CBCL DSM syndrome	43	21	14	8
CBCL competence	78	38	24	16

controlled seizures (seizure-free in the past 6 months).

I also agree with the recent study by Ba-Diop et al.<sup>14</sup> Based on systematic studies in sub-Saharan Africa, about 67 % of seizures are generalized, while in Kenya in children with epilepsy, between 33.6 and 70 %, 4 % report generalized tonic seizures. Clonic seizures and incipient seizures, focal between 13.1 and 78.6 % but consistent with Samia et al.<sup>15</sup>

Compared with the recent study by Karanja et al.<sup>16</sup> on mean seizure age, epilepsy type and AEDs, almost half (48 %) of the children had their first seizure before the age of 2 years. Generalized tonic–clonic seizures were reported in 136 (76.8 %) children and 57.6 % received only one type of AED.

Compared to the current study, this also contrasts with a study by Mung'ala-Odera et al.<sup>17</sup> in rural Kenya, where the prevalence of latent epilepsy was higher at 68.2 %. This may be because the earlier study was conducted in a community setting, as opposed to this study, which was conducted in a hospital where more severe forms of the disease are

likely to occur. In addition to the above findings, the present study found that logistic regression analysis showed no significant association between the prevalence of emotional and behavioral problems and age, sex, primary caregiver, caregiver educational level, or place of residence, the child's place of residence ( $P > 0.05$ ). Also in this study, it was found that the prevalence of emotional and behavioral problems increased significantly with age of first seizure ( $P = 0.001$ ), seizure type ( $P = 0.024$ ), number of antiseizure drugs taken ( $P < 0.001$ ), and IQ score ( $P < 0.001$ , limit = 0.001). Consistent with current research on the prevalence of emotional and behavioral problems, the study by Karanja et al.<sup>16</sup> reported that 82 children had high clinical scores on at least one of the eight CBCL syndrome scales. The overall prevalence of emotional and behavioral problems among study participants was 46.3 % (95 % confidence interval: 38.8–54). In addition, Mung'ala-Odera et al.<sup>17</sup> reported that patients with GTC epilepsy were more likely to be diagnosed with learning disabilities and psychiatric disorders than

Table 11. Relation between clinical characteristics of the studied children with epilepsy and emotional and behavioral problems.

	Emotional and behavioral problem [n (%)]		P value	OR	95 % CI	
	No	Yes			Lower	Upper
Age at first seizure						
2–5 years	17 (36.2)	15 (28.3)				
6–10 years	30 (63.8)	36 (67.9)	0.001	4.47	1.92	10.39
>10 years	0	2 (3.8)	0.228	0.54	0.05	6.32
Frequency of seizures						
Once or more daily	17 (36.2)	33 (62.3)	0.999	0.00	0.000	–
Once or more monthly but not daily	9 (19.1)	15 (28.3)	0.078	3.106	0.880	10.96
Irregular frequency	8 (17.0)	5 (9.4)	0.167	2.667	0.664	10.70
None in the last one year	13 (27.7)	0				
Type of seizure						
GTC	30 (63.8)	39 (73.6)				
Focal	17 (36.2)	7 (13.2)	0.024	0.317	0.116	0.862
Absence	0	7 (13.2)	0.999	0.039	0.000	
Number of antiepileptic drugs						
One	1 (2.1)	0				
Two or more than two	21 (44.7)	4 (7.5)	1.000	0.000	0.000	.
None	25 (53.2)	49 (92.5)	0.000	0.097	0.030	0.314
IQ score						
Average	46 (97.9)	18 (34.0)				
Below average	1 (2.1)	24 (45.3)	0.999	9.508	0.000	.
Borderline	0	11 (20.8)	0.000	61.33	7.714	487.6

IQ, intelligence quotient.

patients with focal epilepsy, focal epilepsy and electrical sleep states ( $P < 0.05$ ) consistent with Ng and Hodges.<sup>18</sup> Also consistent with the study by Choudhary et al.<sup>19</sup> who report that the prevalence of behavioral problems was high in the generalized and partial seizure group compared to the control group (42 and 53.8 %). In addition, behavioral problems were more common in patients with the highest number of seizures ( $\geq 3$  per year), with significant  $P$  values ( $\chi^2 = 5.067$ ,  $P = 0.024$ ).

#### 4.1. Conclusion

Epilepsy at childhood had significant impact on the emotional, behavioral, and mental health aspects with early age of first seizure, use of multiple AED and low IQ score.

#### Conflicts of interest

None declared.

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