

# Psychiatric Comorbidity in Children with Epilepsy: A Cross-sectional 5 Years Rural Prevalence Study

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**ABSTRACT**

**Background:** Epilepsy is one of the most common chronic neurological disorders. In children, it has long debilitating course and is associated with comorbidities including psychiatric comorbidity. To tackle this burden of comorbidities, we must know the extent of problem. Hence, there is a need for estimation of prevalence of psychiatry disorder in children with epilepsy. **Aim:** The present study was aimed at measuring the prevalence of various psychiatry disorders among children suffering from epilepsy. **Settings and Design:** Cross-sectional chart review. **Methodology:** We reviewed case record files of all patients with a diagnosis of epilepsy in the age group of 9–17 years. Chart review was done for 5 years, May 1, 2007, to April 30, 2012. A total of 718 patients record were included in the study after satisfying inclusion criteria and excluding nonepilepsy diagnosis. **Statistical Analysis:** Statistics was done using Statistical Package for Social Sciences (SPSS 18.0). Descriptive statistics were used to calculate the result, Chi-square and Mann–Whitney U-test used wherever applicable. **Results:** The prevalence of childhood psychiatric disorder among children with epilepsy found to be 31.2%. We also found that having a partial component (73.21%,  $n = 164$ ) in seizure has more chances of psychopathology in comparison to generalized seizure (8.1%,  $n = 18$ ). Among them, those having a partial component with generalization (66.96%,  $n = 150$ ) had a greater prevalence of psychopathology. Mental retardation was most common psychiatric disorder among psychopathology followed by manic/depressive illness (unipolar) followed by unspecified nonorganic psychosis. **Conclusion:** From our study, we demonstrate the significant mental health needs of children with epilepsy. The evident high prevalence of psychiatry disorder emphasizes the need for psychopathology assessment and treatment as a part of any comprehensive epilepsy clinic.

**KEYWORDS:** Children, epilepsy, prevalence, psychiatry comorbidity

## INTRODUCTION

Epilepsy is one of the most common chronic neurological disorders. Epilepsy is defined by the International League Against Epilepsy<sup>[1]</sup> as a chronic neurological condition, characterized by recurrent seizures.<sup>[2]</sup> Fifty million people have epilepsy worldwide of which 33 million are children. Importantly, 80% of the affected population resides in developing world.<sup>[3,4]</sup> Epilepsy is commonly associated with behavioral changes<sup>[5]</sup> and is the single largest neurological problem facing developing countries today. While assessing psychopathology, studies mainly used dimensional measures<sup>[6-8]</sup> to describe problem which pose problem for clinician for treatment approach. Very few studies<sup>[9]</sup> used categorical measure for assessing psychopathology which led to better understanding of problem and management.

In developing countries like India due to large burden of patient population on epileptologist, the associated problems are neglected leading to incomplete treatment and increased morbidity.<sup>[4]</sup> Hence, there is a need for estimation of prevalence

of psychopathology in children with epilepsy, to define the problem and describe unmet needs of children with epilepsy. Till date, studies in India used dimensional measure<sup>[10]</sup> for identifying psychopathology. To the best of our knowledge, this is the first study in India estimating the prevalence of psychopathology in children with epilepsy using categorical measure.

## METHODOLOGY

The present study was conducted at the Epilepsy Clinic of Central Institute of Psychiatry, Kanke between July 2012 and January 2013. Epilepsy clinic caters to rural population of Jharkhand. On any given day, the new patient is interviewed thoroughly by taking detailed history and examination. Focus

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is always kept on both neurological and psychological aspects. Diagnosis is made by two independent psychiatrist. For diagnosis of Epilepsy International League Against Epilepsy classificatory system is used. While classifying psychiatry diagnosis International Classification of Disorder-10<sup>[11]</sup> is used. All collected data are collected on institute designed case record file, and it is stored for future follow-up.

In this study, we reviewed case record files of all patients diagnosed of epilepsy within age group of 9–17 years. Chart review was done for 5 years, May 1, 2007, to April 30, 2012. A total of 841 case record files satisfying inclusion and exclusion criteria were included for review. Out of which 123 were excluded from study considering diagnosis other than epilepsy such as dissociative convulsion ( $n = 115$ ), vasovagal syncope ( $n = 5$ ), or migraine ( $n = 3$ ). A total of 718 case record files were carefully examined, and finding was recorded in predesigned sociodemographic and clinical data sheets. Statistics was done using SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc. Descriptive statistics were used to calculate result, Chi-square, and Mann–Whitney U-test used wherever applicable.

**RESULTS**

Table 1 shows the prevalence of childhood psychiatric disorder among children with epilepsy found to be 31.2%. Table 2 shows similar mean age of children in both groups of with or

**Table 1: Prevalence of psychopathology in children with epilepsy**

Childhood psychiatric disorder ( $n=718$ )	$n$ (%)
Present	224 (31.2)
Absent	494 (68.8)

**Table 2: Comparison of sociodemographic characteristics in patients with and without childhood psychiatric disorder**

Variables	Childhood psychiatric disorder (mean rank)		U	P
	Present ( $n=224$ )	Absent ( $n=494$ )		
Age of onset of epilepsy	247.55	410.26	30,251.00	<0.01**
Duration of epilepsy	483.87	302.26	54,752.00	<0.01**
Variable	Childhood psychiatric disorder	Mean	SD	
Age of Onset of Epilepsy (In Days)	Present	5.86	4.53	
	Absent	9.56	4.00	
Duration of Epilepsy (In days)	Present	7.07	4.18	
	Absent	3.36	3.65	

\*Significance at  $P<0.05$ , \*\*Significance at  $P<0.01$ . SD: Standard deviation

without psychopathology. While there is earlier age of onset of epilepsy in children with epilepsy having psychopathology than children with epilepsy without psychopathology. Children with epilepsy having psychopathology had a longer duration of epilepsy than children with epilepsy without psychopathology. Table 3 shows significant differences in education and occupation between children with epilepsy with and without epilepsy, majority of children were found to be illiterate leading to unemployment. Furthermore, a significant difference was present in socioeconomic status and habitat, which suggested the majority of children, belonged to lower socioeconomic strata, and also from the rural area. There was a significant difference in drug status of children with epilepsy with psychopathology and without psychopathology. The majority of children with epilepsy with psychopathology were on drugs, in contrast majority of children with epilepsy without psychopathology were drug-free. There was a significant difference in past psychiatric history and past medical history of children with epilepsy when compared to children with epilepsy without psychopathology. Signifying majority of children with epilepsy with psychopathology had positive past psychiatric and medical history. There was a significant difference in birth and developmental history, suggesting majority of children with epilepsy with psychopathology had significant birth and developmental history. In addition, significant difference noted among children with epilepsy with psychopathology and children with epilepsy without psychopathology about seizure status. Table 4a shows the prevalence of psychiatric disorder among seizure type, showing children with epilepsy with psychopathology, had complex partial seizure (CPS) to secondary generalization as most common seizure type followed by Simple partial seizure (SPS) to CPS to secondary generalization followed by epilepsy undetermined followed by SPS to secondary generalization, and SPS to CPS being most uncommon type. Table 4b shows that having a partial component (73.21%,  $n = 164$ ) in seizure has more chances of psychopathology in comparison to generalized seizure (8.1%,  $n = 18$ ). Among them, those having a partial component with generalization (66.96%,  $n = 150$ ) had a greater prevalence of psychopathology. Table 5 shows distribution of psychopathology among different psychiatric disorder, signifying, mental retardation was most common psychiatric disorder among psychopathology followed by manic/depressive illness (unipolar) followed by unspecified nonorganic psychosis followed by pervasive developmental disorder followed by hyperkinetic disorder followed by conduct disorder followed by schizophrenia [Figure 1].

**DISCUSSION**

**Sample characteristics**

In our study, the advantage of a categorical measure is its ability to allow determination of a specific diagnosis that can be used to guide treatment where a dimensional measure fails to specify a diagnosis. There is no study so far which has used a retrospective design, and there are very few studies which have utilized only categorical measures of psychopathology. Caplan *et al.*<sup>[12]</sup> used structured diagnostic interviews and 60 children with complex partial epilepsy and 40 children with generalized epilepsy

**Table 3: Comparison of sociodemographic and clinical characteristics in patients with and without childhood psychiatric disorder (categorical variables)**

Variables	Childhood psychiatric disorder		$\chi^2$	df	P
	Present (n=224), n (%)	Absent (n=494), n (%)			
Gender					
Male	157 (70.1)	325 (65.8)	1.291	1	0.36
Female	67 (29.9)	169 (34.2)			
Marital status					
Married	1 (0.4)	3 (0.6)	0.154 <sup>f</sup>	1	0.630
Unmarried	223 (99.6)	491 (99.4)			
Religion					
Hindu	158 (70.5)	360 (72.9)	2.016	2	0.053
Muslim	54 (24.1)	99 (20.0)			
Other	12 (5.4)	35 (7.1)			
Education					
Illiterate	111 (49.6)	43 (8.7)	155.259	2	<0.01**
Up to 5 <sup>th</sup>	64 (28.6)	211 (42.7)			
6 <sup>th</sup> -12 <sup>th</sup>	49 (21.9)	240 (48.6)			
Occupation					
Student	95 (42.4)	415 (84.0)	129.598	1	<0.01**
Unemployed	129 (57.6)	79 (16.0)			
Socioeconomic status					
Lower	93 (41.5)	212 (42.9)	4.598	2	0.03*
Middle	93 (41.5)	170 (34.4)			
Upper	38 (17.0)	112 (22.7)			
Habitat					
Rural	171 (76.3)	352 (71.3)	2.014	1	0.022*
Urban	53 (23.7)	142 (28.7)			
Drug status					
Drug naïve/free	99 (44.2)	327 (66.2)	30.908	1	<0.01**
On drugs	125 (55.8)	167 (33.8)			
Past psychiatric history					
Present	26 (11.6)	29 (5.9)	7.170	1	0.004**
Absent	198 (88.4)	465 (94.1)			
Past medical history					
Present	63 (28.1)	94 (19.0)	7.465	1	0.002**
Absent	161 (71.9)	400 (81.0)			
Family psychiatric history					
Present	68 (30.4)	138 (27.9)	0.442	1	0.056
Absent	156 (69.6)	356 (72.1)			
Family medical history					
Present	15 (6.7)	33 (6.7)	0.000	1	0.129
Absent	209 (93.3)	461 (93.3)			
Birth and developmental history					
Present	112 (50.0)	31 (6.3)	184.735	1	<0.01**
Absent	112 (50.0)	463 (93.7)			
Medical disease					
Present	20 (8.9)	40 (8.1)	0.139	1	0.106
Absent	204 (91.1)	454 (91.9)			
Seizure status					
Active	33 (14.7)	64 (13.0)	9.844	2	0.013*
Controlled	98 (43.8)	277 (56.1)			
Lost to follow-up	93 (41.5)	153 (31.0)			

\*Significance at  $P<0.05$ , \*\*Significance at  $P<0.01$ . f. Fisher exact correction used

**Table 4a: Prevalence of psychiatric disorder among seizure type**

Seizure type	Childhood psychiatry disorder		F	df	P
	Present (n=224)	Absent (n=494)			
GTCS	12 (5.4)	29 (5.9)	31.247 <sup>f</sup>	9	<0.001**
SPS	4 (1.8)	17 (3.4)			
CPS	8 (3.6)	18 (3.6)			
SPS – CPS	2 (0.9)	29 (5.9)			
SPS – CPS – GTCS	55 (24.6)	164 (33.2)			
Atonic/absence/myoclonus	6 (2.7)	13 (2.6)			
SPS – GTCS	26 (11.6)	74 (15.0)			
CPS – GTCS	69 (30.8)	96 (19.4)			
Epilepsy undetermined	29 (12.9)	39 (7.9)			
Others	13 (5.8)	15 (3.0)			

\*\*Highly significance was calculated at  $P < 0.001$ . Fisher exact correction used. GTCS: Generalized tonic-clonic seizure, SPS: Simple partial seizure, CPS: Complex partial seizure

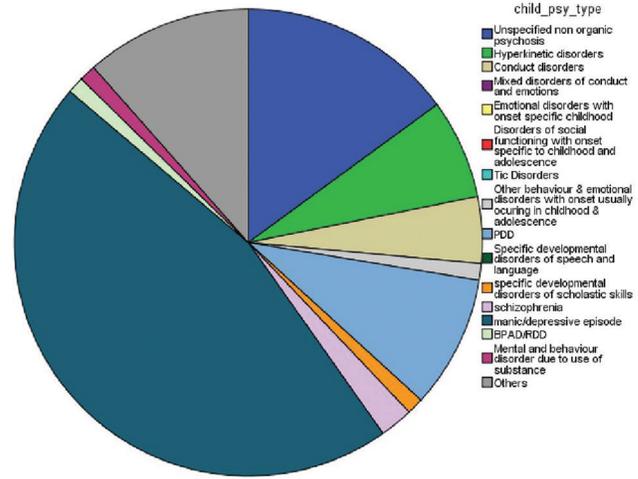
**Table 4b: Prevalence of psychiatric disorder among seizure type**

Seizure type	Childhood psychiatry disorder present (n=224), n (%)
Generalized	18 (8.1)
Focal	164 (73.21)
Focal to secondary generalization	150 (66.96)

**Table 5: Distribution of psychopathology among different psychiatric disorder (n=224)**

Childhood psychiatric disorder	n (%)
Mental retardation	137 (61.16)
Unspecified nonorganic psychosis	13 (5.80)
Hyperkinetic disorder	6 (2.67)
Conduct disorder	4 (1.78)
Other behavior and emotional disorders with onset usually occurring in childhood and adolescence	1 (0.45)
Pervasive developmental disorder	8 (3.57)
Specific development disorder of scholastic skills	1 (0.45)
Schizophrenia	2 (0.89)
Manic/depressive illness (unipolar)	40 (17.86)
Bipolar affective illness	1 (0.45)
Mental and behavior disorder due to use of volatile substance	1 (0.45)
Others	10 (4.46)

were included in their study. Similarly, Thome-Souza *et al.*<sup>[13]</sup> evaluated 55 children with epilepsy using a structured interview and Jones *et al.*<sup>[14]</sup> identified 53 children aged 8–18 years with recent onset epilepsy to characterize the spectrum of comorbid psychiatric disorder using the Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> edition (DSM-IV).<sup>[15]</sup> Three studies have combined dimensional and categorical measures of behavior in



**Figure 1: Distribution of different psychiatric disorder (excluding mental retardation) among children with psychopathology (n = 87)**

children with epilepsy. Caplan *et al.*<sup>[16]</sup> evaluated 101 children with complex partial epilepsy using both the Child Behavior Checklist (CBCL) and a structured interview for categorical diagnosis; Davies *et al.*<sup>[9]</sup> in a nationwide epidemiological study identified 67 children with epilepsy to assess the rates of psychiatric disorder in children aged 5–15 years and lastly Dunn *et al.*<sup>[17]</sup> evaluated 173 children in the age range of 9–14 years with epilepsy using the Child/Adolescent Symptom Inventory in addition to categorical measures. Thus, the sample size selected for our study was adequate and larger in comparison to previous studies recording the prevalence of epilepsy using categorical measures. We studied prevalence in hospital setting, which caters to needs of rural areas of Jharkhand state. The availability of well-maintained case record files at institute was reason for choice of hospital-based prevalence than community prevalence.

**Clinical correlates**

Our data revealed that the children with comorbid psychiatry illness had a significantly earlier onset of epilepsy and epilepsy lasting for a longer duration in comparison to children without psychopathology ( $P < 0.001$ ) [Table 2]. Comorbidity not only add up burden to illness but also increase uncontrolled epilepsy duration, leading to increased morbidity and disability affected life years. A study by Datta *et al.*<sup>[10]</sup> reported period of uncontrolled seizure duration lasting for >3 years. It is worthwhile to consider that recurrent seizures have high chances of developing comorbidity.<sup>[18-20]</sup> Psychiatry and medical history is a strong predictor of the development of epilepsy in children, especially febrile convulsions in early part of life and head injury.<sup>[21,22]</sup> Our sample reported 7% had psychiatric history and 29% had family psychiatry history, against 21% and 7% reported past medical and medical family history, respectively. The majority of those who had positive history reported febrile convulsion and head injury. Making them leading causative factors for epilepsy in later life.

**Prevalence**

The prevalence psychiatry comorbidity in children with epilepsy was found to be 31.2% [Table 1]. A similar finding

was seen by Davies *et al.*<sup>[9]</sup> where DSM-IV-based psychiatric diagnoses were present in 37% of children with epilepsy. A recent meta-analysis of 46 studies in 2434 children with epilepsy measuring psychiatric comorbidity using the CBCL<sup>[8]</sup> has found comorbidity in range of 16%–77%.<sup>[16-8]</sup>

### Epilepsy type

Comorbidity of psychiatry disorder in epilepsy is not uniform, but it varies with its different types of epilepsy. In our sample, most common seizure type in epilepsy associated with psychiatric comorbidity was CPS leading to a secondary generalization (generalized tonic-clonic seizures [GTCS]) (30.8%,  $n = 69$ ). Against SPS to CPS (0.9%  $n = 2$ ) was the most uncommon type of epilepsy to be associated with psychiatric comorbidity. While SPS to CPS to GTCS (24.6%,  $n = 55$ ) and GTCS (8.1%  $n = 18$ ) was in middle of causation list. It also was noted that having a partial component (73.21%,  $n = 164$ ) in seizure had more chances of psychopathology in comparison to generalized seizure (8.1%,  $n = 18$ ). Patients having a partial component with generalization (66.96%,  $n = 150$ ) had a higher occurrence of psychiatric comorbidity. Many authors supported this claim in the past.<sup>[12,13,23,24]</sup>

### Comorbidity

Affective illness was reported in 17.86% of children with epilepsy. This picture was also seen in various studies conducted during the past 10 years in community or university-affiliated settings, where depression and anxiety were found in 16%–31% of children and adolescents with epilepsy.<sup>[19,24-26]</sup> Similarly, studies using structured psychiatric interview like K-SADS, DSM-IV-based mood and anxiety disorder diagnoses have reported a prevalence of 25%–36.4% in children and adolescents with epilepsy.<sup>[13,19,24,25]</sup>

Psychosis as a comorbidity in children with epilepsy was reported higher when seen in children with CPS, prevalence reported to be 10%.<sup>[12]</sup> However, this might be inflated rates as other types of seizure were not included in study. Our study which includes all types of seizure had 6.69% of children with epilepsy with psychosis as comorbidity [Table 5].

Hyperkinetic disorder (attention deficit hyperactivity disorder [ADHD] in DSM-5) was diagnosed in 2.67% of children with epilepsy [Table 5]. Other studies using clinical samples and DSM-IV based criteria for ADHD have found symptoms of ADHD in 14%–38% of children with epilepsy.<sup>[12,13,25,27,28]</sup> The probable reason for the mismatch is that in the majority of these studies, reporting of ADHD disorder was based on a dimensional measure which may not fulfill all criteria as per DSM-IV or DSM-5. In contrast, we used strict criteria to fulfill diagnosis. Patients with subsyndromal symptoms were not included in the study.

The prevalence Autism spectrum disorder was found to be 3.57% [Table 5]. A population-based epidemiological study reported pervasive developmental disorders in 16% of children with complicated epilepsy (additional neurological deficits) and 0% in children with uncomplicated epilepsy.<sup>[9]</sup> Considering that our sample constituted both complicated and uncomplicated epilepsy, which explains the difference in prevalence rate. In addition, in a clinic-based survey of children with epilepsy,

ASD was found in only 9% of the population,<sup>[13]</sup> which again sways pendulum in our reported prevalence.

Intellectual disability was found to be comorbid in 21.2% children with epilepsy in total population. A similar picture was also seen in epidemiological studies which demonstrate significantly higher rates of comorbidity in children with epilepsy and mental retardation than in children with epilepsy having an average IQ.<sup>[9,29]</sup>

The prevalence of specific development disorder of scholastic skills was found to be 0.45%. This is very less when compared to a population-based study which documented reading disorders in 18.6%, writing disorders in 17.6%, and mathematics disorder in 14.7% children with epilepsy.<sup>[30]</sup> Illiteracy, lower socioeconomic strata, lack of awareness are major reason for discrepancy. Another reason could be due to sample constitution; our sample had one-fifth of children with intellectual disability.

### CONCLUSION

The goal of a comprehensive epilepsy clinic should be to provide assessment and treatment not only for seizures but also for the psychiatric problems experienced by the child with epilepsy. This study demonstrates the significant mental health needs of children with epilepsy. The high prevalence of problems emphasizes the need for psychopathology assessment and treatment as a part of any comprehensive epilepsy clinic.

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### Conflicts of interest

There are no conflicts of interest.

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