**Original Research Article**

# A cross sectional study to evaluate psychiatric co-morbidities in children with epilepsy

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## Abstract

**Background:** Epilepsy is a common neurological condition associated with psychiatric comorbidity. Early detection and treatments are needed to improve quality of life.

**Aim:** To evaluate psychiatric morbidity in children with epilepsy.

**Materials and methods:** After taking permission from authorities, and taking consent from parents or care taker socio-demographic details were taken using semi structured intake proforma followed by application of instruments, the childhood psychopathology measurement schedule (CPMS), Brief psychiatric rating scale for children (BPRS-C).

**Results:** Present study showed 37.7% of psychiatric comorbidities. With high scores in factor I, II, IV, V, VII of CPMS and time of seizure was important factor to be noticed.

**Conclusion:** Psychiatric comorbidity found to be 37.5% in the present study. This shows need for periodic evaluation of children with epilepsy for early intervention.

## Key words

Epilepsy, Comorbidity, Psychiatric disorders.

## Introduction

Epilepsy is a common neurological problem in children, characterized by recurrent seizures. Epilepsy accounts for 0.5% of the global burden of disease, measured in disability adjusted life years (DALYs), with 80% of that burden corresponding to the developing countries. There are no significant gender differences and the highest burden (2.8%) is found in the 5-14 age groups. Children with epilepsy have been

reported to be at high risk for behavioral and psychiatric disorders in population based studies. The diagnosis of epilepsy remains clinical, with particular emphasis on careful history-taking.

**The new clinical definition of epilepsy (ILAE, 2013)**
- At least two unprovoked (or reflex) seizures occurring more than 24 hours apart; or
- One unprovoked (or reflex) seizure and a probability of further seizure similar to the general recurrence risk (at least 60%) after two unprovoked seizure, occurring over the next 10 years
- Diagnosis of an epilepsy syndrome [1]

The term comorbidity is used to refer to the greater than coincidental association of two conditions in the same individual (Feinstein, 1970). Children with epilepsy have been reported to be at high risk for behavioural and psychiatric disorders in population based studies. In a nationwide epidemiological study [2], reported rates of psychiatric disorder were 37%. Many studies reported psychiatric comorbidity ranging from 5.9% - 64% [3, 4].

Study of association between epilepsy and psychiatric comorbidity is important to understand the extent to which the two illnesses are related, to identify common etiology and to develop common treatment protocols effective for both conditions.

Psychiatric symptoms can be classified according to their temporal relationship with seizure occurrence. They can be divided into peri-ictal symptoms (related to the seizure itself) or interictal symptoms (independent of seizures). Peri-ictal symptoms can precede the seizure (pre-ictal), occur during a seizure itself (ictal), or follow the seizure (postictal) [5, 6].

The most frequent psychiatric diagnoses reported in people with epilepsy include psychosis, neuroses, mood disorders and behavioral problems. Depression is the most common

psychiatric comorbidity ranging from 5.2% - 43% in various studies [7, 8]. These children present with atypical symptoms like irritability [9], rapidly fluctuating mood symptoms [10]. Epilepsy patients with comorbid depression report a high rate of suicidal ideation [11]. Comorbid anxiety is common in these patients.

Adolescents with epilepsy are considered to be at a higher risk for anxiety than younger children [12]. Bipolar disorders are rarely diagnosed in paediatric epilepsy population. Psychosis, also, is more frequent in the adolescent epileptic population [13]. In a Malaysian study, ADHD was the most common diagnosis among children with epilepsy [14]. Behavioural problems are more common in school-age epileptics [15].

Children with mood, attention-deficit disorders and autism have a significantly greater risk of developing epilepsy. Population-based studies indicate that people with a history of depression have a four to seven fold higher risk of developing epilepsy. In one of these studies, prior history of suicidality was associated with a five-fold increased risk of developing epilepsy [16].

In a study, Mehta, et al. [17] concluded that seizure frequency and depression are the most important predictors of quality of life in epilepsy patients. S. S. Datta, et al. [18] concluded that seizure disorder was associated with significant psychopathology in 53.8% children, belonging to a higher income group and living in an urban area. Jacob & Tharyan [19] concluded that psychiatric comorbidity is common in people with epilepsy and is associated with potentially modifiable clinical variables. It is under-diagnosed and contributes to poorer quality of life.

There are few studies in Indian context which have studied the psychiatric comorbidities in childhood epilepsy, the present study is done to know psychiatric comorbidities in childhood epilepsy and factors associated with psychiatric comorbidities.

## Materials and methods

### Aim:
- To evaluate psychiatric morbidities in children with epilepsy.

### Objectives
- Prevalence of psychiatric morbidities in children with epilepsy.
- To find out socio demographic factors in children with epilepsy.
- To find out the effect of seizure variables to psychiatric comorbidities.

**Study design:** Cross sectional study.
**Data source:** Department of Child Psychiatry, Niloufer Hospital, Hyderabad which has both OP and IP facility for pediatric patient and equipped with EEG, CT Scan.
Clinical psychologist for assessing I.Q
Sample size 60

Subjects were included based on following criteria
- Epilepsy patients diagnosed by pediatrician/ neurologist,
- Age: 6 years to 17 years,
- I.Q. >70
- Children whose parents had given informed consent

Exclusion criteria were
- Mental retardation (I Q<70),
- CVA with aphasia and other disturbances,
- Below 6 years and Above 18 years
- Children with substance use and organic cause.

### Procedure
A prior permission was taken from the Superintendent, Niloufer Hospital for conducting the study. The sample for the current study consisted of children and adolescents, along with their parent or primary caregiver, who fulfilled the entry criteria. Once children met criteria for the study, parents and children were approached and asked for informed consent. Self-report questionnaires were completed by the caregivers, but since some of the caregivers were illiterate,

the questions were read out by the interviewer. Parents were asked not to include any behaviors that seemed to occur only during or immediately before or after a seizure when completing the CPMS.

Socio-demographic assessment was done using a specially designed semi structured intake proforma. This included baseline demographic data and other factors such as family type and seizure variables, which had been found to be significantly related to psychopathology in earlier studies. Characteristics related to illness of the participants, such as the frequency of seizures, age of onset, the duration of the illness and anti-epileptic medications used were recorded.

### Statistical analysis
Presence of significant psychopathology in this group of children was based on the predetermined standardized cut off score on the CPMS. No cut-offs have been reported to date for individual subscales of the CPMS and thus these were not included in the current analysis. For BPRS-C also predetermined standardized cut off scores were taken.

The data collected was subjected to statistical analysis using means, medians and standard deviation for continuous variables was depicted in tables. Categorical data was depicted in contingency tables. Tests of Comparisons for discrete variables were done by using chi square test. Tests of comparison for continuous variables were done by ANOVA using post Hoc tests (LSD). SPSS16 was used for analyzing data. Null hypothesis was rejected when $P<0.05$.

## Results
Socio-demographic profile was as per **Table – 1**. **Table - 2** shows association of seizure variables with behavioral problems. Among 23 children with behavioral problems 9 children suffered with seizure in the last 1 month. 9 children had seizure episodes in the last 6 months. p value was 0.000 which was significant indicates behavioral

problems were less with more seizure free intervals. **Table - 3** depicts CPMS Factor scores. Significance was seen in Factor 1, Factor II, Factor IV, Factor V, Factor VI. **Table - 4** shows the mean of I.Q. for children with behavioral problems was 74.910 and S.D was 0.648, p value 0.911 which was not significant. **Table - 5** shows the mean of BPRS-C was 14.780; S.D. 4.991, p value 0.001 which was significant.

**Table – 1:** Socio-demographic profile of the sample.

| Variable | With behavioral Problems | | Without behavioral Problems | | Test of significance (Chi Square) | Significance (P value) |
|---|---|---|---|---|---|---|
| | n=23 | 37.70% | n=37 | 60.70% | | |
| Gender | | | | | | |
| Male | 16 | 69.6 | 11 | 29.7 | 9.094 | 0.003 |
| Female | 7 | 30.4 | 26 | 70.3 | | |
| Domicile | | | | | | |
| Rural | 7 | 30.4 | 5 | 13.5 | 2.538 | 0.111 |
| Urban | 16 | 69.6 | 32 | 86.5 | | |
| Religion | | | | | | |
| Hindu | 15 | 65.2 | 16 | 43.2 | 2.742 | 0.098 |
| Muslim | 8 | 34.8 | 21 | 56.8 | | |
| Family Type | | | | | | |
| Joint | | | 3 | 8.1 | 1.963 | 0.161 |
| Nuclear | 23 | 100 | 34 | 91.9 | | |
| Socio Economic Status | | | | | | |
| Lower | 17 | 73.9 | 31 | 83.8 | 0.864 | 0.353 |
| Middle | 6 | 26.1 | 6 | 16.2 | | |
| Education | | | | | | |
| Nil | 0 | | 1 | 2.7 | 2.234 | 0.327 |
| Primary | 23 | 95.7 | 36 | 97.3 | | |
| SSC | 1 | 4.3 | | | | |
| Occupation | | | | | | |
| Student | 23 | 100 | 36 | 97.3 | 0.632 | 0.427 |
| Others | | | 1 | 2.7 | | |
| Handedness | | | | | | |
| Right | 16 | 69.6 | 33 | 89.2 | 3.648 | 0.056 |
| Left | 7 | 30.4 | 4 | 10.8 | | |

## Discussion

The present study is a cross sectional study conducted at Niloufer hospital, Hyderabad. The sample selected was sixty children diagnosed as epilepsy. The socio-demographic data shown in **Table - 1** among all socio demographic variables indicates that gender has significant association with behavioral problems. 69.6% males (16/27) scored high in assessment methods.

This study of children with epilepsy compared children with psychopathology against those without psychopathology. It was found that 37% of epilepsy children had clinically abnormal high CPMS total scores, indicating the presence of behavioral problems in them. This finding was Consistent with the findings of Davies, et al. study [2]. Davies, et al. [2] reported psychopathology in 37% of children and adolescents with seizures.

**Table – 2:** Seizure Variable.

| Variable | With behavioral Problems | | Without behavioral Problems | | Test of significance (Chi Square) | Significance (P value) |
|---|---|---|---|---|---|---|
| | n=23 | % | n=37 | % | | |
| Last seizure Episode | | | | | | |
| < 1 Month | 9 | 39.1 | 7 | 18.9 | 21.813 | 0.000 |
| 1 To 6 Months | 9 | 39.1 | 1 | 2.7 | | |
| 6 Months To 1 Year | 3 | 13.0 | 12 | 32.4 | | |
| > 1 Year | 2 | 8.7 | 17 | 45.9 | | |
| Epilepsy Treatment | | | | | | |
| Nil | 1 | 4.3 | 2 | 5.4 | 4.221 | 0.239 |
| Mono therapy | 14 | 60.9 | 29 | 78.4 | | |
| Dual therapy | 8 | 34.8 | 5 | 13.5 | | |
| Poly therapy | | | 1 | 2.7 | | |
| Epilepsy in 1st Degree Relative | | | | | | |
| No | 19 | 82.6 | 33 | 89.2 | 0.532 | 0.466 |
| Yes | 4 | 17.4 | 4 | 10.8 | | |

**Table – 3:** Population norms for Childhood psychopathology measurement schedule (N=60).

| Total CPMS | | N | Mean | Std. Deviation | Std. Error Mean | F Value | P Value |
|---|---|---|---|---|---|---|---|
| FACTOR I | With Behavioral Problems | 23 | 2.910 | 2.275 | 0.474 | 25.226 | 0.000 |
| | Without Behavioral Problems | 37 | 0.410 | 0.644 | 0.106 | | |
| FACTOR II | With Behavioral Problems | 23 | 9.170 | 6.080 | 1.268 | 51.371 | 0.000 |
| | Without Behavioral Problems | 37 | 0.810 | 1.288 | 0.212 | | |
| FACTOR III | With Behavioral Problems | 23 | 0.610 | 1.076 | 0.224 | 3.444 | 0.069 |
| | Without Behavioral Problems | 37 | 0.460 | 0.730 | 0.120 | | |
| FACTOR IV | With Behavioral Problems | 23 | 1.570 | 2.019 | 0.421 | 12.138 | 0.001 |
| | Without Behavioral Problems | 37 | 1.000 | 1.106 | 0.182 | | |
| FACTOR V | With Behavioral Problems | 23 | 0.700 | 1.329 | 0.277 | 8.908 | 0.004 |
| | Without Behavioral Problems | 37 | 0.140 | 0.585 | 0.096 | | |
| FACTOR VI | With Behavioral Problems | 23 | 0.690 | 0.288 | 0.060 | 16.645 | 0.000 |
| | Without Behavioral Problems | 37 | 0.000 | 0.000 | 0.000 | | |
| FACTOR VII | With Behavioral Problems | 23 | 0.960 | 0.878 | 0.183 | 1.080 | 0.303 |
| | Without Behavioral Problems | 37 | 0.650 | 0.949 | 0.156 | | |
| FACTOR VIII | With Behavioral Problems | 23 | 0.740 | 0.752 | 0.157 | 3.532 | 0.068 |
| | Without Behavioral Problems | 37 | 0.300 | 0.463 | 0.076 | | |

Significance at $p < 0.05$

**Table – 4:** Mean IQ with behavioral problems.

| Variables | | N | Mean | Std. Deviation | Std. Error Mean | F Value | P Value |
|---|---|---|---|---|---|---|---|
| IQ | With Behavioral Problems | 23 | 74.910 | 0.648 | 1.178 | 0.013 | 0.911 |
| | Without Behavioral Problems | 37 | 81.650 | 5.417 | 0.891 | | |

**Table – 5:** Mean and Std. Deviation of BPRS-C.

| Variables | | N | Mean | Std. Deviation | Std. Error Mean | F Value | P Value |
|---|---|---|---|---|---|---|---|
| BPRS-C | With Behavioral Problems | 23 | 14.780 | 4.991 | 1.041 | 12.774 | 0.001 |
| | Without Behavioral Problems | 37 | 1.080 | 1.801 | 0.296 | | |

S. S. Datta, et al. [18] reported, seizure disorder was associated with significant psychopathology in 53.8% children. Otto, et al. reported psychopathology selecting t score >65. In Keene, et al. study [25], t score >70 this may be the reason for low prevalence of psychopathology in Keene, et al. [25] study (40%) than the prevalence rate in Otto, et al. [26] study (61%). This variation in prevalence is due to cut off scores chosen by different researchers. Findings may differ based on the rate of the behavior and type of measurement, which can lead to over or underestimation of problems. In addition, parents' psychiatric status might influence what and how they communicate information.

Some of the studies used categorical diagnoses, which are only assigned when a minimum number of criteria have been met. These different approaches limit the comparison of the present study results as Dimensional methods are used for assessing psychopathology.

There is some evidence that epilepsy-related variables (such as type, duration), but also psychosocial factors and antiepileptic medication, are risk factors in the development of psychopathology, although the exact relation remains unknown. In the present study, results of the analyses of other potential (epilepsy-related) risk factors, showed that seizure frequency were frequently associated with psychiatric symptoms. This finding is not in accordance with the study findings of Orhan, et al. [20]; Dunn, et al. [21]. There was no relation between disease duration and psychopathology and no correlation between psychopathology and the amount of drugs. This finding is consistent with the findings of Orhan, et al. [20]; Dunn, et al. [21], Ayhan [22].

In the present study, results showed that the group with an average IQ obtained significantly higher scores on the CPMS in social, and school performance. This finding is consistent with the study by EAP de Souza, et al. [23]. The worst academic performance in cases with psychopathology symptoms, in a directly proportional relation between academic performance and conduct, rule breaking behavior and school competence.

In the present study, analyses of other potential (psycho social) risk factors, showed that significant association between gender and behavioral problems. This finding is in consistent with the finding of the study by Ayhan [22] not in accordance with study of Ettinger, et al. who did not find a relationship between gender and behavioral problems in children with epilepsy [24]. There is no significant association between age and behavioral problems not in consistent with findings of Oguz, et al. [12] study in which adolescents with epilepsy are considered to be at higher risk for anxiety than younger children. In this study the study population belongs to low socioeconomic grade (80%) and from urban (80%), not in accordance with findings of Datta, et al. [18]. According to Datta, et al. [18] behavioral problems are more in the population belonging to urban and high socioeconomic status.

In the present study analyses of treatment variables showed that 71.7% are on mono therapy 21.7% on dual therapy and 1.7% on poly therapy. There is no significant association between AEDs and behavioral problems consistent with findings of EAP de Souza [23], but not in accordance with other studies where there is significant association between poly therapy and behavioral problems [8, 12, 24].

The prevalence of psychiatric cases, according to total psychopathology scores as assessed by the CPMS among children with seizure disorder was 37.7% more in males. scored high in Factor I, II, IV, V, VII i.e. low intelligence with behavioral problems at disorder, depression, psychotic symptom, physical illness with emotional problems. Majority scored high in conduct disorder this is associated with scores in factor I i.e., low intelligence and behavioral problems. Such results are expected due to the impact of psychological distress on cognitive performance and to the great chance of absenteeism and poor compliance to studies.

In factor V majority scored for questions about fearfulness and sleep problems. The reason for scoring high in factor VII may be mothers' falsification of child eating food. Other questions like fear fullness and seizure frequency.

There are numerous studies reporting that the severity of anxiety and depression in epileptic patients is higher [9, 12, 26].

## Limitations of study

- The sample size was small.
- Normal controls were not taken.
- This was a cross sectional study, and the outcome over a longer duration of follow up with reference to psychiatric problems was not dealt with in this study.
- CPMS is parent self-reporting scale, parents' psychiatric status might influence what and how they communicate information.
- BPRS-C is an observer rated scale. Interviewer was not blind to the measurement scales, which can give minimal bias.
- Subjects were recruited from the clinics of a tertiary care referral centre and the sample may not be representative of the community.

## Future directions

- The present study showed that there is a high prevalence of behavioral problems. Hence, it is important to periodically assess these children for any psychiatric morbidity.
- Parental awareness about the comorbid behavioral problems may be useful. Early diagnosis and treatment of behavioral problems in these children may shorten the chronicity of psychiatric problems and improve quality of life of the patient and their family member.

## Conclusion

Psychiatric disorders are common in epilepsy. Routine screening for psychiatric disorders in epilepsy remains infrequent. Much more needs to be done to improve the detection and treatment of these disabling disorders in epilepsy.

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