

A Study to Assess the Magnitude of Depression in Children and Adolescents with Epilepsy

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Abstract Background: While the risk of mental health problems is increased in young people with chronic epilepsy, many characteristics of these disorders remain to be clarified, including their distribution, timing /onset, aetiology and course. An assumption has been that factors associated with seizures or their chronicity increase the risk of psychiatric comorbidity. However, recent population-based studies report that certain mental health problems, specifically depression, anxiety and suicidal ideation, represent independent risk factors for unprovoked seizures in children and adolescents. These studies provoke the need for study of bidirectional relationship between psychiatric disorders and epilepsy, suggesting that behavioural and psychosocial impairment in epilepsy may be the consequence of unrecognized psychiatric disorder rather than the cause of a psychiatric condition. **Objectives:** To study the relationship between demographic and epilepsy related Depression among the children and adolescents. **Materials and Methods:** 100 consecutive children and adolescents aged 8-17years diagnosed to have epilepsy presenting to the paediatric and neurology outpatient department of J.S.S. Hospital, Mysore from December 2011 to June 2013 were enrolled for the study. Detailed socio-demographic and epilepsy characteristics were recorded in proforma specially designed for the study after fulfilment of the inclusion and exclusion criteria. After screening for mental retardation, all the patients were assessed using self-report CDI for depression and anxiety respectively. **Results:** The study sample contained four different types of epilepsy namely GTCS(60%), Absence(7%), focal/CPS(18%) and hot water/ reflex epilepsy(18%). About 39% of the sample had elevated depression scores. In particular focal/CPS variety had significantly elevated scores for negative mood when compared to absence seizures. **Conclusion:** Although depression symptoms are frequently seen in children and adolescents with epilepsy, they are under recognized and undertreated. It is essential that children and parents receive education about depression and anxiety disorders.

Keywords Epilepsy, Depression, Adolescents, Seizures, Psychosocial

1. Introduction

Epilepsy is one of the world's most prevalent non-communicable diseases affecting approximately 50 million people in the world with no age, racial, social class, and national or geographical boundaries [1]. Worldwide, it is estimated that 10.5 million children under 15 years have active epilepsy, representing about 25% of the global epilepsy population. Of the 3.5 million people who develop epilepsy annually, 40% are younger than 15 years, and more than 80% live in developing countries. [2] Population-based studies on childhood-onset epilepsy indicate annual incidence rates of 61–124 per 100 000 in developing countries, and 41–50 per 100000 in developed countries.

Incidence falls progressively from around 150 per 100 000 in the first year of life to 45–50 per 100000 after the age of 9 years. [2]

Over the past half century, neuropsychology has played an increasingly important role in the assessment of people with epilepsy. Advances in our understanding of brain-behavior relationship have mirrored the rapidly expanding technologies of diagnostic neurophysiology and structural and functional neuro-imaging, resulting in a more accurate understanding of the effects of seizures on higher cortical functions. [3] Furthermore, behavior does not only become altered in the presence of organic variables that alter the structure and functioning of the central nervous system, but also in the presence of psychological and social variables that are mediated through the nervous system. [4, 5] Thus, since the organ of pathology in epilepsy is the brain, epilepsy has been implicated as a cause of impaired behavioral, emotional and cognitive functioning in children suffering from this disorder. [6]

A number of psychiatric and neuropsychiatric disorders are found to occur at a higher rate in children with epilepsy.

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Among all types of psychiatric illnesses in epilepsy, depression and anxiety are most commonly reported psychiatric problems followed by ADHD, OCD, autism, mental retardation and psychotic disorders.

Hence this study was carried out to assess the magnitude of Depression among the childhood and adolescents who are suffering from epilepsy.

2. Objective

To study the magnitude of depression in children and adolescents with Epilepsy and its correlation with Sociodemographic factors.

3. Materials and Methods

The Cross Sectional study was conducted in the Department of Pediatric and Neurology at J.S.S. Hospital, Mysore, Karnataka, India from December 2011 to June 2013. The study enrolled 100 consecutive children and adolescents aged 8 to 17 years diagnosed to have epilepsy presenting to the outpatient Department of Pediatric and Neurology at J.S.S. Hospital, Mysore. Detailed socio-demographic and epilepsy characteristics were recorded in proforma specially designed for the study after fulfillment of the inclusion and exclusion criteria. All patients between the age group of 8-17 years of either gender who have been diagnosed as epilepsy with or without medication were included in the study after obtaining the informed Consent.

Presence of psychiatric disorder prior to the onset of seizure disorder and Mental Retardation were excluded from the study. No Mood Modulator drugs were given in our study. All the study participants were screened for any other diseases and all the biochemical values were normal were included in the study.

4. Tools Used

1. A detailed proforma specially designed for the study to collect data, which included demographic, seizure related and antiepileptic medication related details.
2. Binet-kamath intelligence scale for screening mental retardation.
3. Children's depression inventory-2[CDI-2] for assessment of depression. [8]

The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver. 2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc. Data are expressed in term of Percentage and figures. Appropriate Statistical test have been used to test the level of Significance. $P < 0.05$ is considered as significant.

5. Results

A total of 100 subjects were Selected for the study in the study period who were found to be not mentally retarded by Binet-kamath intelligence scale.

Table 1. Socio Demographic Profile of the Subjects

Socio Demographic Profile		No of Patients (n=100)
Age in years	<10	21
	10-15	39
	>15	40
Gender	Male	55
	Female	45
Residence	Urban	35
	Rural	65
Religion	Hindu	93
	Muslim	6
	Christian	1
Socioeconomic Status	I	1
	II	35
	III	64
	IV	0
	V	0

In our study 55% of the subjects were male and 65% of them reside in the rural areas. Majority (93%) belonged to Hindus and 64% belonged to Class III according to Modified B G Prasad Socio Economic Status.

The education level of the primary caregiver was found to be 29% who has passed their intermediate, 19% of them had graduated. 48% of caregivers had completed high school and with 4% of had completed only middle school.

There was history of febrile convulsions in 11% of patients. 6% of patients had family history of epilepsy and 2% of them had family history of psychiatric disorder.

Table 2. Different types of Epilepsy

		No of Patients
Types of Epilepsy	GTCS	60
	Absence	7
	CPS	15
	Hot Water Epilepsy+	18

GTCS- Generalized Tonic Clonic Seizure; CPS- Complex Partial Seizure

Of the 100 patients included for the study 60% had generalized tonic-clonic seizures, 7% with childhood absence seizures, 15% with focal/complex partial seizures and 18% with hot water/reflex epilepsy.

Children's Depression Inventory -2 is a 27 item self-rated symptom orientated scale suitable for school age children and adolescents to assess their depression status. On this scale out of the 100 epileptic children in the sample, 23% of patients had very elevated and 16% had elevated scores on CDI scale.

Table 3. Total Depression scores on CDI and other Determinants of Depression

		No of Patients
Depression Total score	≤ 59 (average)	44
	60-64 (High Average)	17
	65-69 (Elevated)	16
	70 & Above (Very elevated)	23
Scores for Emotional problems	≤ 50	40
	51-60	10
	61-70	40
	71-80	10
Scores for Functional problems	≤ 50	18
	51-60	19
	61-70	45
	71-80	18
Scores for Negative mood/physical symptoms	≤ 50	30
	51-60	11
	61-70	51
	71-80	8
Scores for Negative self-esteem	≤ 50	43
	51-60	11
	61-70	38
	71-80	8
Scores for Ineffectiveness	≤ 50	24
	51-60	21
	61-70	44
	71-80	11
Scores for Interpersonal problems	≤ 50	13
	51-60	45
	61-70	20
	71-80	18
	81-90	4

Nearly 40% of patients had elevated scores for emotional problems and 10% with very elevated scores. About 45% of patients had elevated score for functional problems and 18% having very elevated scores. 51% of patients had elevated scores for negative mood/ physical symptoms and 8% presented with very elevated scores. One more interesting finding was most of the patients had irritable mood. 38% of patients had elevated scores for negative self-esteem and 8% had very elevated scores for the same. 44% of patients had elevated scores for ineffectiveness with 11% having very

elevated scores. Only 18% of patients had elevated scores and 4% having very elevated scores for interpersonal problems.

There was no significant association between scores of depression and any of the socio-demographic variables which included age, sex, education, domicile and socio-economic status. There was no significant association between Type of Epilepsy and Depression Score (chi Square =13.902, $P=0.075$, $df=6$).

When depression scores were co-related with type of epilepsy, though we did not find significant results with total depression scores per se, we found positive co-relation pertaining to negative mood so also with emotional problems, which was maximum in patients with complex partial seizures. An interesting finding was that most of the children scored high for irritable mood.

6. Discussion

The cause of depression in patients with epilepsy are probably multifactorial, including clinical (seizure frequency, seizure type or foci, epilepsy duration, age at onset) and psychosocial factors (quality of life, life stressors, employment, marital status). [8] Clinical or psychosocial factors cannot fully account for the high prevalence of depression in patients with epilepsy because the biological characteristics of epilepsy also affect the manifestation of depression. [9, 10]

For depression, age and gender have been the most studied child characteristics. While some studies showed a correlation with increasing age/adolescence, others have not found such a relationship. Adolescent females are at highest risk of depression in the general population, but the evidence for female preponderance in children with epilepsy is inconsistent, with only a few studies showing a relationship.

Regarding demographic factors e.g. age and gender, Caplan et al [11] indicated that there has been a tendency for epileptic patients with affective and anxiety disorders to be female (63% vs 43%), however, the correlation was not significant. Turkey et al [12] showed that female gender was an independent predictor for depression in epileptic subjects (73.7% vs 26.3%, $P=0.04$).

Table 4. Co relation of type of Epilepsy to Various other Determinants of depression

Variables	Types of Epilepsy				P value
	GTCS (n=60)	Absence (n=7)	CPS (n=15)	Hotwater epilepsy (n=18)	
Depression score	53.77±6.4	51.14±1.86	57.13±10.35	54.17±7.96	0.275
Emotional problems score	48.57±5.33	46.43±2.23	52.53±9.28	48.78±6.12	0.092
Functional problems score	58.37±7.73	54.29±4.68	60.73±9.54	59.17±9.39	0.381
Negative mood/Physical symptoms	51.28±6.47	48.71±3.45	57.33±11.61	51.22±7.35	0.025*
Negative self-esteem	45.02±2.96	44±0	46.53±5.48	45.78±3.69	0.315
Ineffectiveness	55.32±6.98	53.57±5.22	58.13±8.05	56.33±7.82	0.460
Interpersonal problems	59.92±9.38	56.57±4.65	59.27±15.01	59.94±11.86	0.884

Regarding the association of depression with the type of seizure, Roeder et al [13] showed that diagnosis of focal seizures was correlated with severe depressive symptoms ($P < 0.05$) in 96 participants. Three other studies stated depression and other psychiatric disorders to be more frequent in children with focal seizure. Mandebaum and burack [14] found children with generalized non-convulsive seizures to be at a higher risk for internalizing behavior problems than were children with generalized convulsive seizures or simple partial seizures.

Hoare et al [15] found children with CPS to have more psychiatric disturbances than did children with seizure types. In contrast Verma and Nicholas [16] did not find differences in behavioral disorders between children with idiopathic seizures and those with symptomatic seizures.

Mendez et al [17] reported that patients with epilepsy and depression had fewer generalized tonic-clonic seizures than epilepsy patients without depression. Depression is reported more frequently in patients with complex partial seizures and temporal lobe foci than in patients with generalized epilepsy or extra-temporal foci. [18] Similarly in our study, though we did not find significant results with total depression scores per se, we found positive co-relation pertaining to negative mood, also with emotional problems which was seen in majority of patients with complex partial seizures.

When one speaks about the psychological process one can understand how complex the relationship among depression, anxiety, and epilepsy is because it activates intrapsychic variables linked to subjective interpretations that modulate and maintain the dysfunctional emotions, regardless of their origin. The interpretative distortions are present when an arbitrary inference appears, such as “people don’t accept me because I am epileptic.” Many times the person with epilepsy reaches this conclusion in the absence of sufficient evidence. This is reinforced by his or her disqualifying feeling, “I am not capable, I am different from the others,” together with a learned perception of rejection as Scambler and Hopkins demonstrate. [19] The perception of oneself as inept and abandoned results in a series of personal difficulties and the perception of interpersonal reactions as without control, leading to what is called psychosocial stress. Gramstad et al, [20] have also shown that negativism and low perception of self-efficacy are important predictors of emotional adjustment and quality of life. Noticing that events are controlled by external factors more than by personal influence is a central problem in adults with epilepsy, causing anxiety and depression. In addition, the occurrence of seizures as well as the psychosocial problems triggered by epilepsy can lead to the development of an external locus of control. These patients evaluate themselves as having little control over the basic events of life, which causes intensification of the chronic anxiety and depression.

7. Conclusions and Recommendations

The prevalence of symptoms of depression is high in

patients with epilepsy, consistent with previous studies on children and adolescents with epilepsy.

Although depression symptoms are frequently seen in children and adolescents with epilepsy, they are under recognized and undertreated. It is essential that children and parents receive education about depression disorders. Increased awareness of the clinical presentations of depressive disorders may help clinicians to develop effective prevention and intervention strategies to improve the long term outcome.

The role of pediatrician is discerning depression symptoms in this special population is of prime importance for the holistic management of the child. Prompt referral at the earliest will ensure better treatment outcome with respect to both psychiatric co-morbidity as well as seizure control in these individuals.

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