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Depression and anxiety in children with epilepsy: A case-control study

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Abstract

Introduction: Epilepsy is a chronic disease which affects child's behavior and function. Children with epilepsy in comparison to healthy children are more at risk for behavioral and cognitive disorders. In this study we examined the depression and anxiety in children with epilepsy compared to healthy control group.

Materials and Methods: This case-control study was conducted on patients who referred to child and adolescent psychiatric clinics of Dr. Sheykh and Ibn-e-Sina Hospitals in Mashhad (Iran) during 2015-2016. In this study 30 epileptic children aged 8-12 years and 30 healthy children with the same age and gender were selected. Depression-anxiety symptoms were measured by Children Depression Inventory (CDI), Children's Behavioral Issues List (CBCL) tests and demographic data. The major stressors and information about characteristics of epilepsy were achieved by questionnaire. Data were analyzed through descriptive statistics, chi-square, Fisher's exact tests, independent t-test and U Mann-Whitney tests by using SPSS version 16.0.

Results: According to the findings, level of depression and anxiety symptoms in epileptic children were higher than healthy children ($P=0.01$). There was no significant relation between mother's age, number of used medications and duration of taking medication and depression and anxiety in epileptic children.

Conclusion: Based on the results, epileptic children have the higher Frequency of depression and anxiety than the healthy children. However the frequency of depression and anxiety in epileptic children was independent to number of medications, duration of taking medications and mother's age.

Keywords: Anxiety, Children, Depression, Epilepsy.

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Introduction

Epilepsy is a chronic disease significantly affecting children performance and behavior. Epileptic children are at higher risk of behavioral and cognitive disorders than healthy children. Various behavioral problems have been observed in epileptic children including mood variation,

irritability and agility, reduced attention and difficulty in math. However, studies have shown that anxiety and depression are more prevalent (1). Different results have been reported in studies aimed at investigating the relationship between epilepsy, anxiety and depression in children and adolescents. Some studies have shown that these

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individuals had higher levels of depression than healthy people, while there was no difference between the groups regarding anxiety and the mothers showed higher anxiety and depression than the healthy group (2). In other studies, the levels of anxiety and depression among patients and their mothers were different from that of the control group (3-6).

Epileptic children encounter more anxiety disorders as a result of higher attention deficit hyperactivity disorder and learning disorders (7-12). The results of a study which evaluated epileptic children aged 18-30 months showed that there was a direct correlation between severity of epilepsy and behavioral disorders (13,14).

This is also related to recurrence of epileptic seizures (15-17). Other studies have also shown that epilepsy severity is the most important factor in anxiety (16,17).

Anxiety is induced or exacerbated by psychological response to epilepsy and these psychological responses lead to unpredictable nature of epilepsy, limitation of activity and life which, in turn, leads to a decrease in self-esteem and isolation from the community.

The results showing that anxiety can exacerbate epilepsy are not strong enough, but, in some cases, increased anxiety has led to an increase in the frequency of epilepsy (18,19). Increased anxiety symptoms in children are more often reported as refusal to go to school, panic attack, or obsessive-compulsive disorder (20,21). Iranian studies have focused on older age groups. In a study in Tehran, the anxiety level was reported 44.9% among 138 patients with epilepsy (18).

In another study by Zahiruddin among 98 patients with epilepsy, 51.6% experienced depression (19).

These disorders are associated with a decrease in the individual's performance and quality of life of patients. Studies have also shown that psychiatric disorders in epileptic children are highly relevant to stressing families, other than the nature of epilepsy.

It is obvious that having a child with a chronic illness can have many effects on the performance and mental status of parents. Finding these parents and treating them is a part of a child treatment. Considering different results of anxiety and depression disorders in patients with epilepsy and their parents, these disorders should be considered for timely and appropriate treatment to evade further problems. Therefore, identifying these disorders and assessing potential impact of these disorders individual performance is very important in clinical evaluation (20).

Materials and Methods

The case-control study was performed on epileptic children referred to child and adolescent psychiatric clinics of Dr. Sheykh and Ibn-e-Sina Hospitals in Mashhad (Iran) from March 2015 to May 2016.

Inclusion criteria for case group: 8-12 years old, children who received diagnosis of epilepsy for at least one year and treated with medication, lack of systemic disease or progressive brain disorder in the child, having no sensory-motor disability and mental retardation, children who live in a traditional-nuclear family (father-mother-child), parents are satisfied with the child to participate in the study. Inclusion criteria for control group: 8-12 years old, children without epilepsy, lack of systemic disease or progressive brain disorder in the child, having no sensory-motor disability and mental retardation, children live in a traditional-nuclear family (father-mother-child), parents are satisfied with the child to participate in the study. Exclusion criteria for case and control group: Having a history of psychiatric problem, lack of written informed consents. The sample size was calculated in two groups using the following formula. Considering a power of 80% and an alpha error of 0.05, the sample size assumption for this study was 30 children in each group.

Research instrument

A) Children Depression Inventory: This is a self-report 27-item questionnaire which scored in a three-point Likert-type scale: Zero (sometimes), one (often) and two (always). It measures depression in 5 subscales of negative mood, interpersonal problems, ineffectiveness, anhedonia and negative self-esteem. The higher score indicates more severe depression. The study of external psychometric properties of this questionnaire has shown its acceptable internal consistency (each item coefficient with total score was ranged between 0.21 and 0.60) and retest reliability (0.70). In this study, the Persian version of the questionnaire was used which its adequate internal consistency (with Cronbach alpha coefficients of 0.83) and retest reliability (0.82) were confirmed by performed study (21-24).

B) Children's Behavioral Issues List Aheshan (CBCL): To measure behavioral problems in children, the behavioral list of children aged 6-18 years (CBCL) Ahenshah was used.

It includes a comprehensive set of forms for assessing competencies, adaptive behavior, and problems. Parents, parental successions, adolescents and teachers are completing forms related to cases with 6-18 year. Validity and

reliability of this questionnaire have been confirmed in Iran (25-27).

All the procedures in this study were in conformity with the Declaration of Helsinki and were approved by the local Human Research Ethics Committee. Descriptive statistics are presented as mean \pm standard deviation and percentages. Categorical variables were compared using chi-square or Fisher's exact tests. The independent t-test and the U Mann-Whitney test were used for comparing means of variables. Correlations were analyzed by Pearson correlation coefficient. Statistical analyses were performed using SPSS version 16.0 and P value less than 0.05 was considered statistically significant.

Results

In this study, 30 children (mean age 9.6 ± 1.4 years) were enrolled in case group and 30 children (mean age 9.9 ± 1.3 years) were enrolled in control group. Demographic and baseline characteristics data were summarized in Table 1. Most type of epilepsy was generalized tonic clonic (85%). The number of medications consumed by patients in most cases was higher than the two drugs (70%). As indicated in Table 1, the mean ages of the children in both healthy and epilepsy groups were 9.6 and 9.9 years and the mean ages of mothers in both healthy and epilepsy groups were 34.2 and 35.1 years respectively. The mean duration for epilepsy in the epileptic group was 44.4 months.

Table 1. Demographic indicators of epileptic and healthy children

Variables	Case		Control		
	n	%	n	%	
Sex	Female	3	10	9	30
	Male	27	90	21	70
Duration of epilepsy diagnosis (year)	< 3	18	60	-	-
	≥ 3	12	40	-	-
Type of Epilepsy	Partial	3	10	-	-
	Generalized	9	30	-	-
	Other	18	60	-	-

Mean scores in life stress, child depression, internalized and externalized problems variables with DSM and factor analysis, and anxiety subscale with DSM, and anxiety/ depression sub-scale with factor analysis and the total score of behavioral disorders based on the DSM and factor analysis were higher in the epileptic group than the healthy children. According to the literature, the anxiety and depression in children are manifested in behavior. Therefore, the behavioral problems score regarding internalized and externalized problems was also calculated separately. The subscales of anxiety in DSM and anxiety / depression in factor analysis were also calculated separately. The F value of consistency of variances was not statistically significant for depression, internalized problems with the factor analysis. In other words, the mean variations of the two groups are identical. Regarding life stress, subscales of anxiety with DSM, internalized and externalized problems with DSM, subscales of anxiety/depression with factors analysis, externalized problems with factor analysis, total score of behavioral problems with DSM criteria and factor analysis, the modified values were used in calculation of F values (when the variances are not identical). The total F values

for all variables of depression, subscales of DSM/ anxiety, internalized and externalized problems with DSM and factor analysis, total score of behavioral problems with DSM and factor analysis, and also subscale of anxiety/ depression with factor analysis were significant.

In other words, the mean difference in the above variables were significant and there are significant differences between the two groups. There were significant relationships between subscale of anxiety with DSM and children depression ($r=0.58$, $P=0.01$), internalized problems with DSM and depression and subscale of DSM/anxiety ($r=0.71$, $P=0.01$), externalized problems with DSM and depression and internalized problems with DSM ($r=0.41$, $P=0.04$) and ($r=0.49$, $P=0.01$), the subscale of anxiety / depression with factor analysis and depression, subscales of anxiety with DSM, internalized and externalized problems with DSM criteria ($r=0.7$, $r=0.78$, $r=0.85$, $r=0.52$, P for all=0.01), internalized problems with DSM and subscales of anxiety / depression with factor analysis ($r=0.44$, $r=0.5$, $r=0.95$, $r=0.56$, p for all=0.01) respectively. Regarding life stress, there was no significant difference between two groups with $T=1.28$. In other words, the difference between

the two groups is equal for life stress. There is no relationship between the mother's age, the number of drug items and the duration of the drug, with anxiety and depression in any of the subscales and in the child's behavioral problems. Based on this blue curve, the behavioral patterns of seizure

children and red charts point to behavioral problems in healthy children.

Another point from this chart is that children's behavioral problems are not related to maternal stress and are more likely to be related to the nature of epilepsy itself.

Table 2. Comparison of two groups in depression and behavioral problems of children

Variables	Case	Control
Life stress	1.3±1.1	0.86±0.73
Depression	18.26±5.2	6.33±6.6
anxiety sub-scale with DSM	5.2±1.4	1.16±0.87
Internalized problem with DSM	12.7±5.7	32.2±3.5
Externalized problem with DSM	24.1±10.3	8.9±6.3
behavioral problems with DSM	36.9±14.5	12.1±8.2
Internalized problem with factor analysis	19.3±7.2	6.1±6.5
Externalized problem with factor analysis	25.4±11.9	6.7±4.7
Behavioral problems with factor analysis	79.2±27.3	27.3±13.9
Anxiety/ depression sub-scale with factor analysis	10.9±4.1	3.4±1.4

Table 3. Comparing depression and behavioral problems of epileptic/healthy children

	F	P	t	P	Mean difference
Life stress	6.7	0.01	-1.28	0.2	-0.3
Depression	0.08	0.77	-7.6	0.00	-11.9
anxiety sub-scale with DSM	30.5	0.00	-6.8	0.00	-1.4
Internalized problem	7.8	0.00	-7.7	0.00	-9.5
Externalized problem	6.0	0.01	-6.6	0.00	-15.2
anxiety/ depression sub-scale with factor analysis	16.7	0.00	-9.3	0.00	-7.4
Internalized problem with factor analysis	0.84	0.36	-7.4	0.00	-13.1
Externalized problem with factor analysis	17.4	0.00	-7.9	0.00	-18.7
Behavioral problems with DSM	5.4	0.02	-8.1	0.00	-24.7
Behavioral problems with factor analysis	7.3	0.00	-9.2	0.00	-51.9

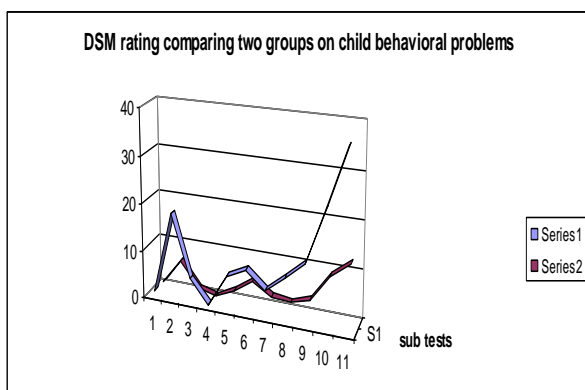


Figure 1. Comparing behavioral problems of epileptic and healthy children based on DSM criteria

Discussion

The findings indicated that levels of anxiety and depression in the epileptic children were higher than the control group. Mean scores of life stress, child depression, internalized and extrenalized problems with DSM-IV and factor analysis, the

subscale of anxiety with DSM-IV, the subscale of anxiety-depression with factor analysis, total score of behavioral problems based on DSM-IV and factor analysis in the epilepsy group were higher than the control group. For comparing anxiety and depression symptoms in epileptic and healthy groups, the values for all of the above variables were significant except for life stress, i.e., all these variables were higher in epileptic children. However, there was no significant difference for life stress in the two groups. According to results, there was no relationship between age status of mothers and anxiety and depression in children and their behavioral problems. There is also no relationship between consuming medication items and anxiety and depression in children and their behavioral problems.

There is no significant difference between the duration of medication use and the anxiety and depression of children, and their behavioral problems.

In a study in Turkey, investigating the relationship between epilepsy and anxiety and depression in epileptic children and adolescents and their mothers, the epileptic children and adolescents had higher levels of depression than healthy people, while there was no difference for anxiety with the healthy group (20).

The result of this study and our study was consistent on the higher depression levels but there is no consistency regarding anxiety as it was higher in our study. In a study in 2003, anxiety and depression in epileptic children and adolescents were clearly higher than healthy ones, which is consistent with the results of this study. In that study, 101 children and adolescents with epilepsy aged 6-16 years reported 23% of anxiety with 18% showed mild anxiety and 5% moderate anxiety (28). The result of another study was consistent with our study based on higher level of anxiety and depression in epileptic children and adolescents. In that study, the anxiety level in children and adolescents was 48.5% which was significantly higher than control group with 16.8% and depression in children and adolescents was 33%, which was 16% in the control group. In individuals with uncontrolled epilepsy, higher anxiety was reported (29).

The results of many other studies have shown that the anxiety and depression levels in the epileptic children were higher than the healthy ones which are consistent with the present study (28).

Alwash showed that there was no clear relationship between age and sex, type of epilepsy, its duration, anxiety disorders, and severity of anxiety was related to the severity of epilepsy, number of medication items and how to control epilepsy. Children with severe or uncontrolled epilepsy treated with several medications were very susceptible to anxiety (30-32).

These studies were consistent with the present study regarding medication items to anxiety levels in epileptic patients. However, in another study in 1998, age, sex, number of medications and type of epilepsy did not change the results. There was no obvious relationship between anxiety and duration

of epilepsy, its onset age, and the number of recent attacks (29). This study is consistent with our study regarding no relationship between the number of medications to the anxiety levels in the epileptic patients. As stated above, there is no relationship between the number of medication items and anxiety and depression in the children. Of course, this may be due to small sample size and use of two medications by most patients.

The general behavior problems of epileptic children were clearly higher than that of the healthy group. Therefore, there is also a correlation with the conducted studies (33,34).

This study was conducted for the first time in Iran. Of course, if we had more sample size, the results could be more generalized to the community.

We suggest that another study be conducted with a larger sample size for epileptic children, so that the result can be more generalized. Also, the relationship between the type and severity of epilepsy, the age of onset, whether it is controlled or not, the frequency of attacks, the electroencephalographic information and the relationship between the types of medications with the anxiety and depression of the child will be further evaluated.

Conclusion

Epileptic children have the higher frequency of depression and anxiety than the healthy children. However, the frequency of depression and anxiety in epileptic children was independent to number of medications used, the duration of using them and mother's age.

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References

1. Curatolo P, Moavero R, de Vries PJ. Neurological and neuropsychiatric aspects of tuberous sclerosis complex. *Lancet Neurology* 2015; 14(7): 733-45.
2. Kwong KL, Lam D, Tsui S, Ngan M, Tsang B, Lai TS, et al. Anxiety and depression in adolescents with epilepsy. *J Child Neurol* 2016; 31(2): 203-10.
3. Kwon O-Y, Park S-P. Depression and anxiety in people with epilepsy. *J Clin Neurol* 2014; 10(3): 175-88.
4. Scott AJ, Sharpe L, Hunt C, Gandy M. Anxiety and depressive disorders in people with epilepsy: A meta-analysis. *Epilepsia* 2017; 58(6): 973-82.
5. Altalib HH, Berg AT, Cong X, Vickrey BG, Sperling MR, Shinnar S, et al. Presurgical depression and anxiety are not associated with worse epilepsy surgery outcome five years postoperatively. *Epilepsy Behav* 2018; 83: 7-12.

6. Fisher PL, Noble AJ. Anxiety and depression in people with epilepsy: The contribution of metacognitive beliefs. *Seizure* 2017; 50: 153-9.
7. Mazur JE. *Learning and behavior*. USA: Routledge; 2016.
8. Carson J, Weir A, Chin RF, McLellan A. Socioeconomic deprivation is an independent risk factor for behavioral problems in children with epilepsy. *Epilepsy Behav* 2015; 45: 105-9.
9. Dunn DW, Austin J. Behavioral issues in pediatric epilepsy. *Neurology* 1999; 53(5 Suppl 2): S96-100.
10. Hutchison AK, Kelsay K, Talmi A, Noonan K, Ross RG. Thought disorder in preschool children with Attention Deficit/Hyperactivity Disorder (ADHD). *Child Psychiatry Hum Dev* 2016; 47(4): 618-26.
11. Forouzanfar MH, Afshin A, Alexander LT, Anderson HR, Bhutta ZA, Biryukov S, et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet* 2016; 388(10053): 1659-724.
12. Reilly C, Atkinson P, Das KB, Chin RF, Aylett SE, Burch V, et al. Neurobehavioral comorbidities in children with active epilepsy: a population-based study. *Pediatrics* 2014; peds. 2013-3787.
13. van Iterson L, Zijlstra BJ, Augustijn PB, van der Leij A, de Jong PF. Duration of epilepsy and cognitive development in children: A longitudinal study. *Neuropsychology* 2014; 28(2): 212.
14. Mitchell WG, Scheier LM, Baker SA. Psychosocial, behavioral, and medical outcomes in children with epilepsy: a developmental risk factor model using longitudinal data. *Pediatrics* 1994; 94(4): 471-7.
15. Austin JK, Dunn DW, Caffrey HM, Perkins SM, Harezlak J, Rose DF. Recurrent seizures and behavior problems in children with first recognized seizures: a prospective study. *Epilepsia* 2002; 43(12): 1564-73.
16. Austin J, Perkins S, Johnson C, Fastenau P, Byars A, Dunn D. Behavior problems in children at time of first recognized seizure and changes over the following 3 years. *Epilepsy Behav* 2011; 21(4): 373-81.
17. Clancy MJ, Clarke MC, Connor DJ, Cannon M, Cotter DR. The prevalence of psychosis in epilepsy; a systematic review and meta-analysis. *BMC Psychiatry* 2014; 14(1): 75.
18. Bahrenian A, Karamad A. [Generalized anxiety disorder prevalence rate in patients with epilepsy referred to neurology clinic of Emam Hossein Hospital affiliated Iranian epilepsy society]. *Research in medicine* 2005; 29(3): 230-8. (Persian)
19. Zahiroddin A, Ghoreishi F. [A survey of depressive symptoms in patients]. *Research in medicine* 2006; 30 (4): 305-8. (Persian)
20. Plioplys S. Depression in children and adolescents with epilepsy. *Epilepsy Behav* 2003; 4: 39-45.
21. Saylor CF, Finch A, Spirito A, Bennett B. The children's depression inventory: A systematic evaluation of psychometric properties. *J Consult Clin Psychol* 1984; 52(6): 955.
22. Smucker MR, Craighead WE, Craighead LW, Green BJ. Normative and reliability data for the Children's Depression Inventory. *J Abnorm Child Psychol* 1986; 14(1): 25-39.
23. Dehshiri G, Najafi M, Shikhi M, Habibi Askarabd M. Investigating primary psychometric properties of children's depression inventory (CDI). *J Fam Res* 2009; 5(2): 159-77.
24. Habibi M, Kholghi H, Parija HA, Parandvar Z, Etesami MS. [The psychometric properties of hopelessness scale among children]. *Journal of research and health* 2017; 7(3): 788-95. (Persian)
25. Tehrani-Doost M, Shahrivar Z, Pakbaz B, Rezaie A, Ahmadi F. [Normative data and psychometric properties of the child behavior checklist and teacher rating form in an Iranian community sample]. *Iranian journal of pediatrics* 2011; 21(3): 331. (Persian)
26. Achenbach T. *Integrative guide for the 1991 Child Behavior Checklist/4-18*. Burlington, VT: University of Vermont, Department of Psychiatry; 1991.
27. Shahrivar Z, Shirazi E, Bagheri Yazdi A, Alghband-rad J. Validity of the Child Behavior Checklist-Persian version in a community sample of Iranian youths. *Iranian journal of psychiatry and behavioral sciences* 2011; 5(1): 45-9.
28. Williams J. Learning and behavior in children with epilepsy. *Epilepsy Behav* 2003; 4(2): 107-11.
29. Ettinger AB, Weisbrot DM, Nolan EE, Gadow KD, Vitale SA, Andriola MR, et al. Symptoms of depression and anxiety in pediatric epilepsy patients. *Epilepsia* 1998; 39(6): 595-9.
30. Mustapha A, Odu O, Akande O. Knowledge, attitudes and perceptions of epilepsy among secondary school teachers in Osogbo South-West Nigeria: a community based study. *Nigerian J Clin Pract* 2013; 16(1): 8-12.
31. Williams J, Steel C, Sharp GB, DelosReyes E, Phillips T, Bates S, et al. Anxiety in children with epilepsy. *Epilepsy Behav* 2003; 4(6): 729-32.
32. Alwash RH, Hussein MJ, Matloub FF. Symptoms of anxiety and depression among adolescents with seizures in Irbid, Northern Jordan. *Seizure-Eur J Epilepsy* 2000; 9(6): 412-6.
33. Berl MM, Terwilliger V, Scheller A, Sepeta L, Walkowiak J, Gaillard WD. Speed and complexity characterize attention problems in children with localization-related epilepsy. *Epilepsia* 2015; 56(6): 833-40.
34. Ettinger AB, Kanner AM. *Psychiatric issues in epilepsy: a practical guide to diagnosis and treatment*. Philadelphia: Lippincott Williams and Wilkins; 2007.