ORIGINAL RESEARCH ARTICLE

Screening for Behavioural Abnormality Using Strength & Difficulty Questionnaire (SDQ) in Children with Epilepsy

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ABSTRACT

Aims: To estimate the problem of behavioural co morbidity and to determine risk factors associated with epilepsy in children.

Methods: A prospective observational study using Hindi and Gujarati version of Strength & Difficulty questionnaire (SDQ) was conducted. Children aged 6 to 17 years with epilepsy (CWE) as cases & without epilepsy as controls enrolled. Detailed demographic and clinical data were recorded. The total difficulty score and the subscale scores were compared between two groups. Comparison of the scores were done among the children with epilepsy group also.

Results: 52 children in each group were included. Self-reported SDQ used in 76% and parent reported SDQ used in 27% participants. Prevalence of behaviour abnormality was 25% in CWE. (p 0.004). CWE had significantly higher mean total difficulty score (p<0.001) and mean emotional (p <0.0001) and conduct subscale score (p 0.0024). Children having uncontrolled epilepsy (OR 15, 95% CI 2.9 - 76.3, p 0.0005) and having number of seizures more than 3 (OR 13.33 95% CI 3.4 - 51.04, p 0.0004) were found to be significantly associated with behavioural abnormality.

Conclusion: Epileptic children are at more risk of behavioural problem than in normal children, especially emotional problem and conduct problem. Uncontrolled epilepsy and frequency of seizure were significant risk factor for occurrence of behavioural problem.

Keywords: Children, Epilepsy, Behaviour, SDQ Scale, Risk Factor

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INTRODUCTION

Epilepsy is a chronic disorder characterized by recurrent seizures. The prevalence of epilepsy in Indian children is 5.59 per 1000 population.[1] Children with epilepsy (CWE) are at increased risk of neurological, psychological and physical comorbidities.[2] The reported prevalence of psychiatric disorder is 50-60% and behavioural comorbidity is 43%.[3,4]

There are different scales available for behavioural assessment in children. Strength & difficulty questionnaire (SDQ) is a free, brief and easy to administer screening questionnaire available for behavioural assessment for 3–16-year age group and available in over 40 different languages including Hindi& Gujarati language.[5,6] The SDQ has good psychometric properties in varied cultures and languages and demonstrated use in Indian studies.[6,7,8]

Developed countries have reported high frequency of behavioural problems in CWE.[9,10] Differences in etiology, treatment protocols and social factors may modify the frequency of behavioural problems in different settings. This study was aimed to estimate the prevalence and to determine risk factors associated with behavioural comorbidity in CWE in our set up.

METHODOLOGY

Study setting, design & duration: A cross sectional observational case control study conducted in a pediatric OPD setting over a period of 15 months (July 2019 to October 2020). Ethical clearance was obtained from institutional ethical committee (SMIMER/IEC/OUT/No/4/2019). Written informed consent was taken from the parent/ guardian of the participant.

Inclusion & Exclusion criteria: Children aged 6 years to 17-year age group attending the pediatric OPD were the study population. Children who had been diagnosed with Epilepsy were taken as study group/ cases, while those who didn't have Epilepsy were taken as control group.

Children with epilepsy (CWE) were defined as history of occurrence of two or more episodes of unprovoked focal or generalized seizure with or without abnormal EEG.

Controls were recruited from the pediatric OPD who came for routine health check-up or minor illness and were found to be healthy.

For both the groups children having severe physical and mental disabilities; previous diagnosis of Attention deficit hyperactive disorder (ADHD), Autism or any other psychiatric disorder, had other chronic disease were excluded from the study.

Sample size estimation: Using an Open Epi software and considering positive proportion of behavioural abnormality in CWE of 19.1% and in children without epilepsy of 2.2%[11], sample size of 52 in each group was determined taking 80% power and 95% level of significance into calculation.

Data collection: Detailed information regarding socio- demographic profile, nutritional status of the participants, developmental milestone information, perinatal history, history of consanguinity, maternal age, maternal education level, family characteristics (parent's marital status, number of children in family), family history of epilepsy/ febrile seizure/ mental illness were recorded in proforma. Socio economic class was decided by modified Kuppuswami classification[12]. Participants belonging to class 4 (upper lower) or class 5 (lower) were considered as low socio-economic status in this study. Mother educated up-to or less than primary level was considered as low maternal education.

Epilepsy related characteristics included age at onset, type of epilepsy (generalized/ focal), duration of epilepsy, number of seizures, type and dose of antiepileptic drug (AED), EEG finding (normal/abnormal), CT/MRI finding (normal/abnormal) and whether controlled or uncontrolled epilepsy. Age at onset was defined as child's age in years at the time of epilepsy diagnosis. Duration of epilepsy was defined as the duration between the time of diagnosis of epilepsy and time of behavioural assessment and grouped into <3 years and >= 3 years. Number of seizures were defined as documented episodes of past seizures at the time of behavioural assessment and grouped into <3 and>= 3 in number.

All the children were screened for Intelligent Quotient (IQ) assessment by Malin's intelligent scale[13] and >= 70 scale were included in the study.

Behavioural assessment was done by using Hindi & Gujarati version of Strength & Difficulty Questionnaire (SDQ). For children aged 6 – 10-year age group parent completed SDQ (SDQ - P) and for 11 – 17-year age group self-completed SDQ (SDQ - S) was used. The questionnaire included statements about the behaviour of children to be answered as untrue, somewhat true or not true. Based on participant response SDQ score was calculated which includes total score and 5 subset score. The five-subset score includes emotional problem, conduct problem, hyperactivity, peer problem and prosocial score. Child was considered to have behavioural problem based on Goodman's cut off values [5]. The cut off values for abnormal score for age group 6 – 10 years were: total difficulty scores of 17 – 40, the emotional problem score of 5 – 10, the conduct problem score of 4 – 10, the peer problem score of 4 – 10. The cut off values for abnormal score for age group 11 – 17 years were: total difficulty scores of 20 – 40, the emotional problem score of 7 – 10, the conduct problem score of 5 – 10, the peer problem score of 6 – 10. The hyperactivity score of 7 – 10 and prosocial score of 0 - 4was considered abnormal for all age group. Children found to have abnormal behaviour in our study were referred to child guidance clinic for counselling.

Statistical analysis: Data were entered in Microsoft Excel. Qualitative data were represented by proportion and percentage and analyzed by Chi-Square test, Fisher test or Yate's correction while quantitative data were represented by mean and standard deviation (S.D.) and analyzed by student 't' test. Statistical significance was considered by p value < 0.05 and 95% confidence intervals. Data were analyzed using Open Epi software.

RESULTS

The present study included 52 children with epilepsy as cases and 52 children without epilepsy as controls. Mean age was 12.4 (2.7) and 12.6 (3.2) among cases and controls respectively. Epilepsy related characteristics among cases were: Mean age at diagnosis was 10.40 (2.8) years. Among 52 study subjects 90% had generalized epilepsy and were on sodium valproate monotherapy. Uncontrolled epilepsy was seen in 42% cases. EEG & neuroimaging abnormality was noted in 90% and 13% cases respectively. 13% had duration of epilepsy for more than 3 years.

Baseline information were compared between two groups. Accordingly, the two groups were comparable in terms of common demographic variable like male gender (55% Vs 52%), lower middle socioeconomic class (SEC) (63% Vs 60%), maternal literacy up-to primary level (65% Vs 62%).

History of consanguinity and/or family history of epilepsy were not found in any of the participants. Single marital status was noted in one participant from study group. The proportion of family having more than 2 children in both groups were 73% and 71% respectively. No statistically significant difference was noted regarding family characteristics between two groups.

There was history of LBW and NICU admission in two participants from study group. No other studied abnormal perinatal factors were noted in any of the group.

Statistically significant difference was noted with regard to nutritional status between two groups.39% of participants in study group had BMI more than 18.5 kg/m ^{2} as compared to 21% in control group. Mean BMI value of study group was higher than control group (18.32(1.8) vs 16.95 (2.3), p value <0.01)

Screening for behavioural abnormality was done using self-report version SDQ (SDQ-S) in 76% and parent/ caregiver report version (SDQ-P) in 27%. The abnormal behaviour score was observed in 25% of study group and 5% of control group participants. The difference was statistically significant (p 0.004). Mean total difficulty score was significantly higher in CWE as compared to control group. (17 (8.08) Vs 12.78 (3.7), p < 0.01).

Table 1: Behavioural pattern analysis showed that CWE had maximum abnormality in emotional score (40% vs 5%, p <0.0001) followed by conduct score (23% vs 3%, p 0.0024). The hyperactive score was 5% Vs 2%, p 0.23. Peer problem abnormality was seen in 2% children of study group. Prosocial score was normal for both groups. Statistically significant difference was noted for mean total score, mean emotional problem & mean conduct problem score between two groups.

Table 2: Maximum number of the children having behavioural abnormality were in the age group 11 to 17 year.

Table 1: Comparison of behavioural pattern abnormality

SDQ subcomponent score abnormality	Cases (%)			Mean score ± SD		
	Study Group (n=52)	Control Group (n=52)	P value*	Study Group (n=52)	Control Group (n= 52)	P value#
Emotional problem	21 (40)	3 (5)	<0.001	6.15 ± 2.40	3.96 ± 1.10	<0.001
Conduct problem	12 (23)	2 (3)	0.0024	3.15 ± 1.70	1.52 ± 0.20	0.017
Hyperactive problem	3 (5)	1 (2)	0.23	1.86 ± 1.20	1.40 ± 1.20	0.06
Peer problem	1 (2)	0	0.3	1.32 ± 1.10	0.96 ± 0.60	0.28
Prosocial behavior	0	0	--	7.05 ± 1.10	6.96 ± 0.90	0.63

*Chi square test for proportion; #student 't' test

Table 2: Comparison of risk factors for abnormal behaviour between study and control Group (N=26)

Variable	Cases with abnormal behavior		OR	95% CI	p value
	In Study group (n=22)	In Control group (n=4)			
Age >10	18 (81)	4 (100)	0.45	0.02,10.10	0.62
Male gender	14 (63)	2 (50)	1.75	0.20, 14.9	0.60
Low SES	7 (31)	1 (25)	1.40	0.10, 15.90	0.78
Low Maternal Education	12 (55)	4 (100)	0.13	0.01, 2.75	0.19
Single marital status	00	00	--	--	--
More than 2 children in family	18 (81)	2 (50)	4.5	0.40, 42.20	0.18
Maternal age >35 year	12 (55)	1 (25)	3.6	0.30, 40.20	0.29
Abnormal perinatal factors	00	00	--	--	--
BMI <18.5 kg/m^2	9 (40)	4 (100)	0.07	0.003, 1.60	0.10

OR Odds Ratio; CI Confidence Interval

Table 3: Risk factor analysis for behaviour score among study group (N = 52)

[A] Socio demographic and clinical factors

Variable	Normal behavior score (n=30)	Abnormal behavior score (n=22)	OR	95% CI	p value
Mean age in years (Mean ± SD)	11.8 ± 2.92	13.18 ± 2.28	--	--	0.06
Male gender (%)	14 (46)	14 (63)	0.65	0.20 – 2.00	0.45
Low SES (%)	7 (23)	8 (36)	1.80	0.50 - 6.30	0.3
Low Maternal Education (%)	22 (73)	12 (54)	0.43	0.10 - 1.40	0.16
Single marital status (%)	1 (3)	00	--	--	--
More than 2 children in family (%)	20 (60)	18 (68)	2.20	0.50 - 8.40	0.22
Maternal age in years (Mean ± SD)	36.09 ± 5.4	36 ± 3.5	--	--	0.95
Abnormal perinatal factors (%)	2 (6)	00	--	--	--
BMI <18.5 kg/m^2 (%)	19 (63)	9 (40)	0.40	0.10 - 1.20	0.10

SD – Standard deviation; OR Odds Ratio; CI Confidence Interval

[B] Epilepsy related factors

Variable	Normal behavior score (n=30)	Abnormal behavior score (n=22)	OR	95% CI	p value
Generalized Epilepsy (%)	26 (86)	21 (95)	3.20	0.33 - 31.13	0.31
Focal epilepsy (%)	4 (13)	1 (4)	0.20	0.02 - 1.94	0.16
Abnormal EEG (%)	26 (86)	21 (95)	3.20	0.33 - 31.13	0.31
Abnormal neuroimaging (%)	4 (13)	3 (13)	1.02	0.20 - 5.1	0.70
Uncontrolled epilepsy (%)	2 (7)	20 (91)	15.00	2.9 - 76.3	0.0005
Duration of Epilepsy >3 year (%)	3 (10)	4 (18)	2.00	0.39 - 10.02	0.65
Number of seizure episode > 3 (%)	5 (16)	16 (72)	13.33	3.4 - 51.04	0.0004
Sodium Valproate monotherapy (%)	26 (86)	21 (95)	3.20	0.33 - 31.13	0.31
Age (yr) at diagnosis of Epilepsy (M ± SD)*	10.06 ± 2.8	10.9 ± 2.8	--	--	0.27

* M ± SD – Mean ± Standard deviation; OR Odds Ratio; CI Confidence Interval

Children having abnormal behaviour from both the groups were compared and no significant difference in socio demographic characteristics, family characteristics, perinatal factors and nutritional status associated with behavioural abnormality was noted between two groups.

Table 3: The subgroup analysis of CWE didn't show any significant difference in terms of age, gender, SES, maternal education, marital status and nutritional status between children having abnormal behaviour and normal behaviour.

Among epilepsy related characteristic, children having uncontrolled epilepsy (p 0.0005) and having number of seizures more than 3 (p 0.0004) were found to be significantly associated with behavioural abnormality.

DISCUSSION

This study was conducted to estimate behavioural problems in CWE as compared to those without epilepsy and also tried to study the factors associated with behavioural problems in these children. We used SDQ for behavioural screening in this study. The SDQ scale have been used for behavioural problem screening by other authors in India as well as in countries other than India.[11,14] Behavioural problem was observed in 25% of CWE and 5% of control group in present study. The prevalence of 39% Vs 8% and 19% Vs 2% among cases Vs control was observed by Anita M et al[14]and Novriska et al respectively[11]. Various studies have noted the prevalence of behavioural problem in epileptic children ranging from 19% – 53%[4,9,15,16]. The variability in prevalence noted by others can be due to different age group studied and use of different type of screening tool.

We found emotional problem in 40% and conduct problem in 23% of CWE with a statistical significance. We didn't find statistically significant difference in hyperactivity score, peer problem and prosocial score between CWE and control group in this study. This result is in agreement with study done by Novriska et al[11] Emotional disorders were observed in range of 12% to 31% in different studies.[4,11,14] Psychosocial factors like unpredictability related to seizure occurrence, stigma associated with epilepsy, concern about the control of epilepsy is responsible for emotional problem especially anxiety and depression.[11]

Hyperactivity score abnormality was found by Anita et al[14] and peer problem was found by Anita et al[14], Mcdermott et al[16] and Drewel et al[17]. The risk factors suggested for hyperactivity problem were low intelligence, concomitant neurological damage and AED side effects. We recruited children having normal IQ, none of our children had abnormal neurological findings and none of the children were on poly therapy. That could be the reason for our finding of no difference in hyperactivity score in the present study. Inattentive behaviour has been suggested to be associated with peer difficulties.[17] In our study we didn't find difference in hyperactive and inattention component of SDQ scale. Also, in our study 71% of participants

had completed self-reported SDQ. In SDQ –S children would underestimate their behavioural problem and would present themselves as healthy functioning individuals.[18] It could be the reason for underreporting of peer problem in our study.

In the present study the socio demographic factors, family background, perinatal factors or nutritional factors were not found to be associated with behavioural problem between CWE and control as well as among the study group. Similar results were noted by Novriska et al[11] and Kariuki et al[9]. Few studies have noted the influence of SES in causing behavioural problem but then it was concluded that behavioural problem may be related to increased family stress, less social support and rapidly changing social and family structures.[15] Aloudri et al in their study noted that effect of epilepsy mechanism on behaviour should be addressed more rather than socioeconomic, family or environmental related factors.[19]

Among epilepsy related factors no association was seen between type/duration of epilepsy, age at onset of seizure or type of AED use with occurrence of behavioural problem in this study. However uncontrolled epilepsy and >3 numbers of seizure were found to be associated with behavioural problems. This finding is similar to observation made by other authors.[4,9,11,20] Seizure may cause progressive neural damage leading to accumulative neuropsychological disabilities.[21,22] Early seizures will induce durable effects and long-term exposure to abnormal neural activities as well as increased epilepsy sensitivity will result in functional and structural growth changes in brain.[19,22,23] Chronic epilepsy may negatively affect thinking abilities and intelligence of children.[21,24]

Strength and limitation: Epilepsy is a common chronic illness and this study tried to address the psychopathology associated with it in children. However, this is a cross sectional one-time observational study and there can be possibility of information bias. Further study with large sample size and involving multiple informants to fill out the SDQs is recommended.

Conclusion

Epileptic children are at more risk of behavioural problem than in normal children, especially emotional problem and conduct problem. Uncontrolled epilepsy is a significant risk factor for behavioural problem in CWE. Awareness among the clinicians about the problem and screening followed by confirmation of diagnosis and treatment should be offered to such children.

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