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A Study on Occurrence of Attention Deficit Hyperactivity Disorder in Patients with Febrile Seizures Presenting To Pediatric Hospital, Bikaner, Rajasthan

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Abstract

Introduction: Febrile Seizures (F.S) and Attention-Deficit/Hyperactivity Disorder (ADHD) are disorders of the central nervous system and share common risk factors. The relationship between two remains enigmatic. There is controversy on the possible relation, while some studies approve a strong relation, some exclude any. Hence current study was conducted to assess the risk of ADHD, factors affecting the occurrence of ADHD and association of type of ADHD in patients with F.S.

Methodology: It is a comparative cross sectional study conducted on children between ages 3-12 years, presenting to pediatric department, P. B. M. Hospital, Bikaner. Inclusion Criteria: Group A: Patients who fullfil the diagnostic criteria for febrile seizures in the present or those with documented past history of febrile seizures. Group B: were patients who are not diagnosed with febrile seizures. Exclusion Criteria: Patients with preexisting corporeal or psychological disorder, other types of seizure disorder. Methods of Study: All parents of the patients enrolled in study were subjected to the detailed history taking using a self-designed proforma. For diagnosis of ADHD in this study DSM 5 was used.

Results: ADHD was detected in 14.79% of cases with febrile seizures (p=0.034). Males exposed to this risk factor are more prone to develop ADHD (21.42 %). Risk of developing ADHD is related to multiple episodes of FS (21.88%), family history of FS (35.29%) and use of AED (30%).

Conclusion: This study reports high prevalence of ADHD and also identifies the variables associated with increased risk of ADHD in children with febrile seizures. In view of the high prevalence of ADHD in children with febrile seizure it is imperative for clinicians to detect ADHD in this high risk group to initiate appropriate management, thereby reduce the negative long term consequences.

Introduction

Febrile seizures are seizures that occur between the age of 6 and 60 month with a temperature of 38 degree C (100.4 F) or higher, that are not the result of central nervous system infection or any metabolic imbalance, and that occur in absence of a history of prior afebrile seizures 1 . With prevalence of 2-5% febrile seizure is the most common childhood seizure 2.

Febrile Seizures and Attention-Deficit/Hyperactivity Disorder (ADHD) are disorders of the central nervous system and share common risk factors 3 . ADHD is a neurological- behavioral problem defined as “a persistent pattern of inattention and/or hyperactivity- impulsivity that interferes with functioning or development” according to Diagnostic and Statistical Manual of Mental Disorder (DSM)-5 medical classification system for ADHD published by American Psychiatric Association 4 . In the general population, the prevalence of ADHD is approximately 5 % 5 . ADHD is associated with increased morbidity, impairment, and mortality in adolescence and young adulthood 3 . ADHD is a high-cost/ high-burden disorder. Early detection and intervention may prevent or ameliorate the development of disorder and reduce its long-term impact 6 . Hence, early identification of high-risk groups for ADHD may improve the disease outcome. The relationship between Febrile Seizures and ADHD remains unknown. There is controversy on the possible relation between febrile seizure and ADHD, while some studies approve a strong relation, some exclude any relation 7 .

Thus, the current study is aimed to assess the occurrence of ADHD in children aged 3-12yrs who are diagnosed to have febrile seizure in the current or past.

Aims and Objectives

To assess the risk of ADHD in patients with febrile seizures.

Material and Methods

It is a Comparative cross sectional study conducted in Department of Pediatrics, P.B.M. Hospital, Bikaner, a tertiary care hospital. 284 children between ages 3-12 years who fulfilled inclusion and exclusion criteria were enrolled for the study

Inclusion Criteria

Group A: Patients fulfilling the diagnostic criteria for febrile seizures in the present or those with documented past history of febrile seizures.

Group B: were patients who are not diagnosed with febrile seizures.

Exclusion Criteria

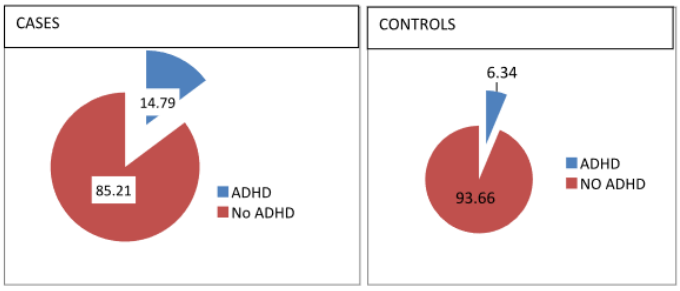
Patients with preexisting corporeal or psychological disorder (anxiety, depression, schizophrenia), with other types of seizure disorder and patients whose parents have not given written informed consent.

Observation and Results

This is a comparative cross sectional study conducted in the Department of Pediatrics, S.P. Medical College Bikaner to study the occurrence of ADHD in patients with febrile seizures. We enrolled 142 patients each in febrile seizure group and control group and analyzed them for occurrence of ADHD.

The prevalence of ADHD among children with febrile seizure was 14.79% in our study which is significantly higher (p=0.034) than the prevalence of in children without history of F.S. (6.34%). ADHD was 2.5 times more prevalent in children with F.S. as compared to age and gender matched controls.

	Cases with F.S.		**Control**	
	No	%	No	%
ADHD	21	14.79	9	6.34
No ADHD	121	85.21	133	93.66
Total	142	100.00	142	100.00
chi-square	**4.510**			
p value	**0.034**			



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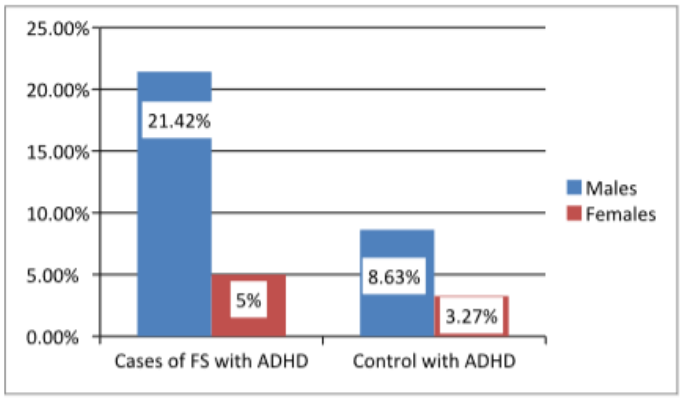
The prevalence of ADHD was 21.42 % in males with F.S. i.e. almost 4 times of that in females with F.S. whose prevalence was 5% (p < 0.007) but this significant male preponderance was not observed in control group (p= 0.6) Male preponderance in occurrence of ADHD was significantly greater in cases with F.S.(21.42%) as compared to control(8.63%). (p= 0.03).

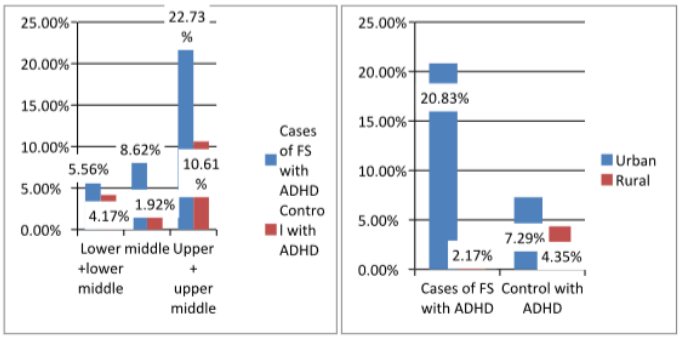
	Cases with F.S.		Control		p value
Gender	ADHD		ADHD		
	No	%	No	%	
Males	18	21.42	7	8.63	0.03
Females	3	5.00	2	3.27	0.6
Total	21	14.79	9	6.34	
p value	0.007		0.21		



No significant age group wise difference in occurrence of ADHD was found between Cases with F.S. and controls.

In cases of F.S. with ADHD, the Hyperactivity/impulsivity and inattention type (38.10%) were most common type, followed by combined (23.8%). Similar trend was observed for controls. Hyperactivity/impulsivity was most common type of ADHD among males in febrile seizure group (33.33%) whereas inattentive type was most common among males in control group. In cases of F.S belonging to 3-5yr age, most prevalent type of ADHD was hyperactivity/impulsivity (50%) followed by inattentive (28.75%) and combined type (21.43%) while in >5yr age group inattentive was most common (57.15%). Similar trend was observed in controls.

ADHD was found almost three times higher in cases with febrile seizures belonging to upper class (22.73%) followed by middle and lower (p=0.043) Prevalence of ADHD was significantly higher among children of febrile seizure residing in urban area (20.83%) as compared to rural area (2.17%).(p=0.019).



ADHD was diagnosed three times higher (35.29%) in those cases of febrile seizures who had positive family history of F.S.(p=0.030) ADHD prevalence was higher in children with Complex Febrile Convulsions (18.75%) as compared to Simple Febrile Convulsions (11.54%) but this difference was not statistically significant. ADHD was significantly higher in children with recurrent episodes of F.S. (21.88%) as compared to those with single episode of F.S. (p=0.001). Patients who were taking AED had 6 times greater prevalence of ADHD (30%) than in children who were not on AED (3.65%) in our study (p=0.000037). ADHD was diagnosed almost two times higher among children on intermittent AED prophylaxis (42.85%) as compared to those on continuous AED prophylaxis (26%). Though ADHD was higher in those with intermittent prophylaxis, the difference was not statistically significant (p=0.38). There was no significant relation between duration of AED use to occurrence of ADHD.

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Discussion

Febrile seizure is one of the most prevalent childhood convulsions. It has been regarded as a benign disorder with good prognosis, although negative effects of FS on mental development have also been reported. Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common and challenging childhood neurobehavioral disorders. Failure to diagnose ADHD prevents children and their families from getting the assistance they need to achieve their full potential in academic and psychosocial settings. In our study Attention Deficit Hyperactivity Disorder (ADHD) was 2.5 times more prevalent in children with F.S. as compared to age and gender matched controls. This finding is in par with a study done by Bahman Salehi which showed a significant relationship between FS and ADHD in children. 7 Bertelsen EN also reported that children diagnosed with febrile seizures had a fully adjusted IRR for ADHD of 1.28 (95% CI, 1.20–1.35) compared with children without febrile seizure. That is Children with febrile seizure had a 20% to 35% increased risk of ADHD compared with children without febrile seizures. 3 Yi-Chia Ku did a 11 years follow-up and found that incidences of ADHD for the FS and control cohorts were 7.83 and 4.72 per 1000 person years, Respectively (HR=1.66) 8 Austin et al. in a study on 300 children of 6-14 age group with first seizures and 196 healthy children showed that children with febrile seizure displayed greater behavioral disorders over 3-year follow-up. 9 Conversely, the majority of population-based studies showed no difference in prognosis between FS and control groups. These population based studies using information from questionnaires completed by mothers, children or teachers, intelligence test, behavioural rating and hospital records had covered almost all affected children in general population. This difference can be due to Berkson's bias as only children with greater severity of F.S. visit hospital and hence more probability to be diagnosed with ADHD compared to general population with F.S.

In our study we found that prevalence of ADHD was 21.42 % in males with F.S. while it was 5% in females with F.S. (p < 0.007). There was no statistically significant difference in gender wise prevalence of ADHD in control group. This goes on to show that males are more prone to develop ADHD when exposed to febrile seizure as compared to females. More over the overall prevalence of ADHD was higher in male which is in par with study done by Venkata J A et al on prevalence of ADHD in primary school children who documented higher rates among males (66.7%) as compared to females (33.3%). 10

Holden SE et al conducted retrospective, observational cohort study and found that incidence and prevalence of ADHD were high in males than females. 11 similar results were found in a study by Ajinkya S et al 12 with boy to girl ratio of 3:2. Alobaidi AKS 13 found that prevalence rates were nearly double for males than female. This gender difference may be due to some factors such as; boys may be more vulnerable than girls to environmental risk factors that cause ADHD, resulting in an actual higher rate of risk of ADHD in boys.

However, a firm consensus on this matter has not been reached. In our study the type of ADHD was Inattentivity (IA) and hyperactivity/impulsivity (HI) in 38.10% each and combined (C) type in 23.8% children in cases with F.S., while 44.4%, 33.3% and 22.22% children with ADHD had IA, HI and combined type respectively in control group (p =0.947). Qureshi A et al 14 carried out a cross sectional review at the Institute of Behavioural Sciences (IBS), Karachi, in all children under 14 years of age and found that 26.9% children had Hyperactive

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subtype, 15.4% had Inattentive subtype and 57.7% had Combined subtype. Gomez R et al 15 in a study examined, prevalence rates of three ADHD types, in Malaysian primary school children and found that the prevalence rates for the Inattentive, Hyperactive Impulsive, and Combined types were 0.96%, 0.32%, and 0.32%, respectively.

Conclusion

This study reports high prevalence of ADHD and also identifies the variables associated with increased risk of ADHD in children with febrile seizures. ADHD was detected in 14.79% of cases with febrile seizures. Males exposed to this risk factor are more prone to develop ADHD. Risk of developing ADHD is related to multiple episodes of FS, family history of febrile seizures and use of AED. Hyperactivity/impulsivity was most frequently observed type of ADHD in cases of F.S belonging to 3-5yr age while inattentive type was more frequent in children & gt 5yr age. ADHD was more prevalent in upper socio-economic class and among those residing in urban area in our study.

In view of the high prevalence of ADHD in children with febrile seizure it is imperative for clinicians to detect ADHD in this high risk group to initiate appropriate management, thereby reduce the negative long term consequences.

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