

Study of Socio-Demographic and Perinatal Factors Associated with Attention Deficit Hyperactivity Disorder in Children

Dr. Asharul Hossain^{1*}, Dr. Sufia Yasmin², Dr. Saswati Nath³

¹Senior Resident Berhampore Mental Hospital

²Medical Officer, R N Tagore UPHC

³Associate Professor, R G Kar Medical College

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*Corresponding author: Dr. Asharul Hossain

Abstract

Original Research Article

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common Neurodevelopmental disorders in childhood and adolescence affects. Prevalence of ADHD among school-age children in different studies varies between 5% and 12% and declines with increasing age. ADHD is generally accepted as having a genetic basis but environmental influences have also been reported as contributing factors. Possible environmental risk factors reported for ADHD have included perinatal complications, these include maternal abuse of substances, prenatal and postnatal viral infections, prematurity, low birth weight, head injury during childhood and several socio-demographic factors such as maternal education, family income, gender, maternal age at pregnancy and emotional stress during pregnancy.

Keywords: Socio-Demographic, Perinatal Factors Perinatal Factors

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INTRODUCTION

To assess the antenatal factors, birth complications, post-natal factors associated with ADHD we have done this study on children attending child guidance clinic will be screened by using Child Symptom Inventory (CSI). Children screened out as having hyper-activity finally was diagnosed as ADHD and other comorbidities according to DSM 5. Control was selected from siblings of the ADHD cases detailed history about socio-demographic and perinatal factors was taken cases and control group from parents. Our study revealed that Males were more affected than females (5:1). ADHD patients had higher birth order than their unaffected siblings. The children with ADHD had significantly higher rates of neonatal complications compared with their unaffected siblings. These results suggest that neonatal complications are probably a nonshared environmental risk factor that may be pathogenic in children with ADHD.

AIMS & OBJECTIVES

- I. To assess the socio-demography factors associated with attention deficit hyperactivity disorder in children
- II. To assess the antenatal factors, birth complications, post-natal factors associated with attention deficit hyperactivity disorder in children

MATERIALS AND METHODS

Study setting

The study was conducted at Child guidance clinic of the Department of Psychiatry, R G Kar Medical College, Kolkata, and West Bengal, India.

Study Population

All children, attended the child guidance clinic from august 2017 to January'2018, were enrolled in the study. All diagnosed cases of ADHD as per DSM 5 were included in the study following inclusion and exclusion criteria. Control was selected from siblings of the ADHD cases detailed history about socio-demographic and perinatal factors was taken cases and control group from parents.

Study period

After getting approval from institutional ethics committee, the work was started and continued up to January 2018. Total time period of the study were six months (August, 2017 to January, 2018).

SELECTION CRITERIA

Inclusion Criteria

- I. Children aged from 3 years to 12 years
- II. Children diagnosed with ADHD according to DSM 5 and having unaffected sibling.

Exclusion Criteria

- I. IQ below 70
- II. Children having any obvious neurological disorder (Cerebral palsy, epilepsy, brain tumour) Children having severe perceptual problem (hearing problem, visual problem)

Sample size

It had been found that, in the child guidance clinic of R. G Kar Medical College about 2 new cases and 4 old cases of ADHD attended for the treatment in one month. That's why in our study we expected 36 patients in 6 months. Total cases were 30 and control was 30.

Methods of data collection

Children attending child guidance clinic were screened by using Child Symptom Inventory (CSI). Children screened out as having hyper-activity finally were diagnosed as ADHD and other comorbidities according to DSM 5. Detailed history about socio-demographic and perinatal factors was taken and were noted in a semi-structured case history pro-forma and were transcribed onto a Excel database and descriptive statistics were done by using SPSS version 23.

Study design

This is a cross sectional, descriptive, case-control study.

Tools used in the study

- I. Child Symptom Inventory (CSI).
- II. DSM 5.
- III. semi-structured case history pro-forma

Statistical Analysis

After collection of data results were analysed by using SPSS version 23.

Ethical consideration

The study proposal along with other relevant documents was submitted to the institutional ethical committee for review and approval. The study was commenced only after the approval was obtained in writing.

RESULT AND ANALYSIS

Children with ADHD who had unaffected siblings ($n = 30$ pairs) were significantly younger than their unaffected siblings (mean age 7.40 [standard deviation {SD} 1.868] yrs. v. 9.30 [SD 2.037] yrs., respectively, $p = 0.000$) (Table 1). Birth order was higher in the ADHD group compared with the sibling group (median 2 v. 1 respectively, $p = 0.000$). As expected, boys were overrepresented in our study group and boys were more affected than girls. Male: female ratio was 5:1 (for ADHD) and 7:23 for control) For children with ADHD and siblings, mean birth weight were respectively 2.280 [SD 0.479] kgs and 2.803 [SD 0.372] kgs.

Table-1: Demographic variables of study population.

Variables	ADHD Mean (std. dev.)	CONTROL Mean (std. dev.)	P-VALUE
AGE	7.40(1.868)	9.30(2.037)	0.000
BIRTH ORDER	2.23(0.858)	1.2(0.407)	0.000
BIRTH WEIGHT	2.280(0.479)	2.803(0.372)	0.000

Table-2: Mean of perinatal factors in cases and controls

FACTORS		ADHD	CONTROL	TEST	P-VALUE
Antenatal general health of mother	Weakness	19(73.1)	7(26.9)	Pearson chi-square	0.002
	Good	11(32.4)	23(67.6)		
Pregnancy induced hypertension	Present	17(85.0)	3(15.0)	Pearson chi-square	0.000
	Absent	13(32.5)	27(67.5)		
Gestational diabetes	Present	10(76.9)	3(23.1)	Pearson chi-square	0.028
	Absent	20(42.6)	27(57.4)		
Antenatal haemorrhage	Present	15(83.3)	3(16.7)	Pearson chi-square	0.001
	Absent	15(35.7)	27(64.3)		
Attempted abortion	Present	4(100.0)	0(0.0)	Fisher's Exact test	0.112
	Absent	26(46.4)	53.6)		
Premature rupture of membrane	Present	14(82.4)	3(17.6)	Pearson chi-square	0.002
	Absent	16(37.2)	27(62.8)		
IUGR	Present	23(85.2)	4(14.8)	Pearson chi-square	0.000
	Absent	7(21.2)	26(78.8)		
Maturity	Preterm	14(82.4)	3(17.6)	Fisher's exact test	0.005
	Term	16(34.04)	31(65.95)		
Delayed birth cry	Present	16(80.0)	4(20.0)	Pearson chi-square	0.001
	Absent	14(35.0)	26(65.0)		
Septicaemia	Present	9(81.8)	2(18.2)	Pearson chi-square	0.020
	Absent	21(42.9)	28(57.1)		
	Absent				

Table 2 showing that in our study the ADHD patients and their siblings were different in many aspects. Their antenatal, perinatal and post natal histories were different very significantly. Patients with ADHD were having mother(73.10%) with weakness and poor health during pregnancy compared to their siblings(26.90%) with P-value-0.002. patients with ADHD mother having pregnancy induced hypertension 85%, gestational diabetes 76.90%, antenatal haemorrhage 83.30%, attempted abortion 100%, premature rupture of membrane 82.40%, Intra-uterine growth retardation 85.20%, prematurity 82.40%, delayed birth cry 80.00%, septicaemia 81.80% than their affected siblings 15%, 23.10%, 16.70%, 00.0%,17.60%, 14.80%, 17.60%, 20.0%, and 18.20% respectively and P-value of the distribution were 0.000, 0.28, 0.001, 0.112, 0.002, 0.000, 0.005, 0.001 and 0.020 respectively. According to our study the ADHD patients are different from their siblings in different antenatal, perinatal and post natal complications.

DISCUSSION

Perinatal complications have been the most studied of the environmental factors implicated in the pathogenesis of ADHD and have received some validity from animal studies.¹⁴ the literature indicates that many confounding factors (socioeconomic status, maternal IQ, family history) can limit the interpretation of case-control studies. An intrafamilial study comparing children with ADHD with their unaffected siblings may provide excellent-to-good matching between cases and controls for several environmental factors and, to a certain extent, for the genetic background. Genetic epidemiologic studies identify mainly nonshared environmental factors, whereas case-control studies identify factors that are more likely to be common to all children in the same family, such as maternal smoking and alcohol consumption, both of which may share genetic determinants with ADHD. Thus, using intrafamilial case-control studies may help to clarify the complexity of the interaction between genetic and environmental factors that may be implicated in this disorder. The first main finding of this study is that the profile of antenatal, perinatal and post natal complications during developmental periods in children with ADHD and their unaffected siblings was not parallel. This is mainly because of an increased level of neonatal complications in the children with ADHD. In contrast to pregnancy, labour and delivery, events experienced in the neonatal period, when the child is more independent of the mother, are conceivably more likely to be specific to each individual, that is, a nonshared factor. This result may suggest that neonatal complications may be a risk factor with a putative causal link to the development of ADHD. This result is also consistent with the fact that genetic epidemiologic studies have identified mainly nonshared environmental factors in ADHD. In our study ADHD patients are having more low birth weight than their siblings. Surprisingly, in the literature, low birth weight (LBW)

(<2500 g) as a neonatal risk factor was almost exclusively associated with ADHD.^{35–38} in these studies, ADHD was a frequent outcome for LBW children; however, LBW children also experienced greater developmental delay. This association may be the result of the effects of general developmental problems. Moreover, other studies^{12, 39, 40} have reported that LBW was associated only with lower IQ scores but not with ADHD. The effect of LBW on attention and motor behaviour remains controversial.¹³ Apart from LBW, no other abnormal neonatal conditions have been reported to be associated with ADHD. The effect of LBW on attention and motor behaviour remains controversial.¹³ Apart from LBW, no other abnormal neonatal conditions have been reported to be associated with ADHD. In the study group, medical conditions that were more frequent in ADHD included several events occurring during the first 2 months of life: neonatal admission to hospital, having been in an incubator, oxygen therapy, general anaesthesia and surgery being the most frequent. Although these findings do not point to a single event that may lead to behavioural or cognitive problems, they do support past research indicating that children with ADHD have a higher prevalence of stressful events in early life.¹² Moreover, these factors, consistent with previous research, suggest that prolonged chronic rather than acute stresses are more likely to be associated with ADHD. It is interesting that some of these factors are clearly associated with hypoxia (e.g., oxygen therapy). This is consistent with findings from animal models indicating that neonatal hypoxia can result in increased locomotor activity later in life.^{41–43} the relation of these neonatal events to pregnancy and labour/delivery needs to be analysed in order to assess their specific role in increasing the risk for ADHD. Surprisingly, smoking and alcohol consumption during pregnancy, which is often reported as environmental risk factors for ADHD, did not differ between patients and their unaffected relatives. Smoking was equally common (58%) in pregnancies leading to affected and unaffected children. Remarkably, this rate is higher than the rate observed in the general population of Quebec (40%).

Several limitations should be kept in mind when interpreting the results of this study. First, our conclusions are based on a sample of 30 children with ADHD and 30 of their unaffected siblings. This is of course a small sample for risk studies. These results need to be confirmed in a larger group in order to ensure their validity. Second, comorbidity is very high in ADHD; it would have been very informative to study perinatal complication according to comorbid disorders. However, the small sample precluded this analysis. Another limitation of this study is that boys were overrepresented in the ADHD group. However, given that girls may be more resilient to developing the disorder, it is expected that some girls may have a high level of perinatal complication and yet do not express

the disease. This bias may therefore be conservative, that is, unlikely to result in false-positive findings. A further limitation of this study is the difference in age and birth rank. Here again, most of the affected children were younger and resulted from a second pregnancy, which is usually considered to be at lower risk than a first pregnancy. Another limitation of this design is its reliance on a maternal retrospective interview, which is the case for almost all studies of maternal lifestyle during pregnancy.¹⁷ In order to have information about the validity of the maternal report; we compared the maternal reports with the information derived from the medical files for 60% of the patients. As reported in the literature, 49 we found that mothers tended to underreport PLDNC. Finally, although using siblings as controls reduces a large number of potential biases, it does not control for 50% of the genes that differ between siblings, making this design more robust than case-control studies but less so than twin studies, which are difficult to conduct.

CONCLUSIONS

To our knowledge, there are very few studies to use an intrafamilial design to address the implication of perinatal complications in ADHD. This design has the important advantage of controlling for many confounding factors, including, to a certain extent, the genetic background. It might be a useful intermediate tool between unrelated case-control and twin risk studies. In addition, this type of design may help to delineate the nature of environmental risk factors and to understand the role of the different factors in the expression of ADHD. The results of this study suggest that neonatal complications are more frequent in children with ADHD compared with their unaffected relatives.

These results suggest that neonatal complications are probably a nonshared environmental risk factor that may be pathogenic in children with ADHD.

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