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Original Research Article

Sociodemographic and Birth Factors Associated With Autism Spectrum Disorder

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Abstract

Background: Autism is a neurodevelopmental disorder which interferes with the person's ability to communicate and relate to others. Median of global prevalence of autism spectrum disorders is 62/10 000. Both genetic and environmental factors are responsible for its development. The aim of this study was to investigate the sociodemographic, prenatal, perinatal, and neonatal risk factors of autism. ***Methods:*** This study was done from the digital database of the child guidance clinic of the department of Psychiatry of a tertiary care hospital in Kolkata. ***Results:*** In this study male-female ratio among autistic children was found 3:1. Two thirds of the children came from urban nuclear families. Families of autistic children were more or less evenly distributed among all social classes. Antenatal, Perinatal and neonatal factors which were found to be significantly associated with Autism were antepartum haemorrhage or threatened abortion, pregnancy induced hypertension, prematurity and pathological jaundice. ***Conclusion:*** The present study found significant correlation between birth factors like antepartum haemorrhage, pregnancy induced hypertension, prematurity and pathological jaundice with autism. Further studies are needed to verify our findings, and investigate the effects of multiple factors on autism.

Keywords: Autism, Demographic factors, Perinatal factors.

INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder, characterized by behavioral, and social dysfunction. ASD is currently regarded as one of the most common childhood morbidities, presenting in various degrees of severity [1]. According to the latest report, the global prevalence of autism has been estimated to be at 0.62% [1].

ASD is multifactorial disease, and both genetic and environmental factors are responsible for its development [2].

A recent study reported that 35% to 40% of autism could be explained by the genetic factors [3, 4].

The remaining 60% to 65% are likely to be resulted from environmental factors, such as prenatal, perinatal, and postnatal factors [5, 6].

Several studies have investigated the relationship between prenatal, perinatal and postnatal factors with autism [7-10]. Their results showed that advanced maternal/paternal age, short gestational age, pregnancy induced hypertension, threatened abortion, caesarean delivery prematurity, low birth weight (LBW), and low Apgar score were associated with increased risk of autism. No single factor consistently showed any positive association.

This study was aimed to find out the sociodemographic factors of children with ASD and association of antenatal, perinatal and postnatal factors with ASD.

AIMS AND OBJECTIVES

- To study the socio-demographic factors of children with Autism spectrum disorders.
- To identify prenatal, perinatal and postnatal risk factors in children with autism spectrum disorder (ASD).

MATERIALS AND METHODS

Study design: A retrospective case–control study using digital database.

Place of study: Child guidance clinic of the department of Psychiatry of R.G Kar Medical college, Kolkata

Study Population: Children aged 3-12 years, diagnosed with Autism spectrum disorder using Diagnostic and statistical manual of mental disorders, fourth Edition (Text Revision) among the children attending child guidance clinic from July 2009 to April, 2018.

Age matched control subjects were taken from Pediatric medicine OPD of the same hospital.

Inclusion Criteria

- At least 3 years of age
- Children fulfilling the DSM-IV TR criteria for autism spectrum disorder.

Exclusion Criteria: Children with visual or hearing impairment.

Sample size: Total 73 cases and 50 controls.

Tools Used

- Digital database maintained maintained in the child guidance clinic
- Updated BG Prasad socioeconomic classification for 2016

METHODOLOGY

This study was done from the digital database of the child guidance clinic. Complete sociodemographic and antenatal and perinatal history obtained from parents are entered in the excel sheet in the clinic. Diagnosis of cases is done using one screening tool (child symptom, Child symptom inventory and final diagnosis is made according to DSM IV TR.

Age matched control was taken from the Paediatrics OPD of the same hospital. Child symptom inventory was used to rule out any neuro-developmental or other psychiatric disorder.

Antenatal factors that were looked for in mothers of autistic children were: Antepartum hemorrhage, pregnancy induced hypertension. Perinatal factors that were looked for in mothers of autistic children were: Birth asphyxia, preterm birth, low birth weight, neonatal facts studied were sepsis, hyperbilirubinemia, and seizures.

RESULTS AND ANALYSIS

There were 73 children with autism and 50 control children. For statistical analysis Chi square test was used. Fisher's Exact Test was used to obtain P values when incidence was less than 5.

Table-1: Description of Study Population

Group	Sex		P Value	Religion		P Value (S)	Total
	Male	Female		Hinduism	Muslim		
Cases	55(75.3)	18(24.7)	.03 (S)	62(84.9)	11(15.1)	0.54(NS)	73(100)
Control	29(58)	21(42)		43(86)	7(14)		50(100)

75.3% of Cases and 58% of control were male. Most children of both cases and control were Hindus.

Table-2: Family Type and Dwelling

Family Type	Frequency (%)
Nuclear	41(62.1)
Extended Nuclear	5(7.6)
Joint	20(30.3)
Total	66(100)
Dwelling	
Urban	41(73.2)
Rural	15(26.8)
Total	56(100)

Two thirds of the children came from urban area and majority of them resided in nuclear families.

Table-3: Birth Order

Birth Order	Frequency (%)
First	39(52.7)
Second	12(16.2)
Third	3(4.1)
Total	54(100)

52.7% children were first born.

Table-4: Education

EDUCATION	FATHER	MOTHER
Illiterate	1(1.4)	0(0)
Primary	11(15.9)	10(14.5)
Secondary	7(10.1)	13(18.8)
Madhyamik	13(18.8)	13(18.8)
Higher Secondary	10(14.5)	11(15.9)
Graduate	24(34.8)	17(24.6)
Post Graduate	3(4.3)	5(7.2)
Total	69(100)	69(100)

Both parents of most children were educated at least up to primary level. 39% fathers and 32% mothers were graduate or post graduate.

Table-5: Occupation

OCCUPATION	FATHER	MOTHER
Does Not Stay With The Patient	5(7.4)	0(0)
Unskilled Worker	4(5.9)	0(0)
Skilled Worker	7(10.3)	1(1.4)
Self Employed	6(8.8)	5(7.2)
Farmer	3(4.4)	0(0)
Shop Keeper	2(2.9)	1(1.4)
Business	18(26.5)	0(0)
Service	20(29.4)	4(5.8)
Professional	3(4.4)	0(0)
Home Maker	0	58(84.1)
Total (Valid)	69(100)	69(100)

Mothers of most children were home makers.26.5% of fatherswere buisinessmen and 29.4% of them were in service. 4.4% fathers were professionals including Engineering and medical profession.

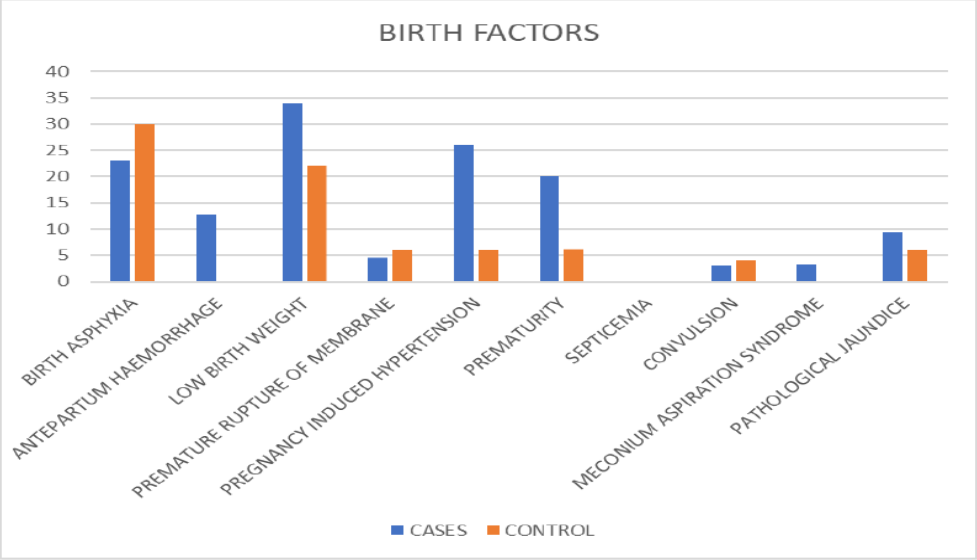
Table-6: Socio Economic Status(SES)

SEX	Frequency (%)
Upper Class	9 (15.3)
Upper Middle Class	12 (20.3)
Middle Class	8 (13.6)
Lower Middle Class	23 (39)
Lower Class	7 (11.9)
Total	59 (100)

Families of autistic children were more or less evenly distributed among all social classes.

Table-7: Birth factors

Perinatal Factors	Whether Present	Groups		Chi Square Value	Significance
		Cases	Control		
Birth Asphyxia	Yes	14(23)	9(30)	.31	NS
	No	47	21		
APH	Yes	9(12.9)	0(0)	.006	S
	No	61	50		
Low Birth Weight	Yes	22(33.8)	11(22)	0.118	NS
	No	43	39		
PROM	Yes	3(4.6)	3(6)	.529	NS
	No	62	47		
PIH	Yes	19(26)	3(6)	.003	S
	No	54	47		
Prematurity	Yes	14(20)	3(6.1)	.028	S
	No	56	46		
Septicaemia	Yes	0(0)	0(0)		NS
	No	62	50		
Convulsion	Yes	2(3.1)	2(4)	0.59	NS
	No	62	48		
MAS	Yes	2(3.2)	0(0)	0.30	NS
	No	61	50		
Pathological Jaundice	Yes	14(19.2)	3(6)	0.031	S
	No	59	47		



Graph-1: Birth factors

Factors which were found to be significantly associated with Autism were antepartum haemorrhage or threatened abortion, pregnancy induced hypertension, prematurity and pathological jaundice.

DISCUSSION

This is a retrospective case–control study using digital database of child guidance clinic of the psychiatry department of R.G. Kar medical college & hospital. Control was taken from Paediatric medicine OPD of the same hospital.

This study was done from the digital record of the case history of the children attending child guidance clinic of a tertiary care hospital in Kolkata. Only the children diagnosed with Autism spectrum disorder were selected.

Table-1 shows that, significantly more (75.3%) children among Autism group than control group were male. Male-female ratio found was 3:1. Most studies have found Autism spectrum disorders more commonly in males, with a ratio of about 4:1. Previous studies also found male preponderance in Autism spectrum disorders [12]. According to the female protective effect hypothesis, more extreme genetic mutations and environmental risk factors are required for a girl to develop autism than for a boy [13].

Most children among both cases and controls were Hindus. This may be because of religion composition in population catchment area.

62.1% of the children came from urban area. Previous studies found a positive association of ASD with urbanicity [14, 15]. Indian village life affords children with myriads of early stimulations with sights, sounds, smells, textures, tastes and helps in socialization by free physical play with siblings, cousins and friends. Urban life deprives children from all these stimulations. Migration to urban area after diagnosis may be another reason of finding more autistic children in urban area.

73.2% of autistic children resided in nuclear families (Table-2). Previous studies also found similar results [16]. In earlier days joint families helped in socializing the child with siblings and cousins, getting stimulation from grandparents, uncles and aunts. These helped in integration of the special child in the society. Recent advent of nuclear families deprives the child from all these stimulations and may be a contributing factor to the development of autistic behavior.

52.7% children were first born. 16.2% were second born (Table-3). Previous studies found varying patterns of birth order effects. Turner T et al in 2011 found an inverted V-shaped effects in multiplex families, where middle births are at high risk; in simplex families, they found a linear effect where risk increases with each additional birth [17].

In our study education level of both parents was more or less evenly distributed at all levels from primary to post graduation. 39% fathers and 32% mothers were graduates or post graduates. Both parents of most children were educated at least up to primary level (Table-4). According to a study by researchers at the University of California, Davis, clusters of children with higher rate of autism occur in places where parents are more educated. But this is because those parents are more likely to get this diagnosis for their child [18].

Table-5 shows, mothers of most children were home makers. 26.5% of fathers were buisinessmen and 29.4% of them were in service. 4.4% fathers were

professionals including Engineering and medical profession. Previous studies showed an association of autism spectrum disorder with technical job of father. There was no association with mother's occupation [19].

In our study, families of autistic children were more or less evenly distributed among all social classes. Most of them were in the range from lower middle to upper middle class (Table-6). Previously some studies found no association of autism with social class [20]. Some studies found higher incidence of Autism in higher social class [21].

Antenatal factors which were found significantly more in Autism spectrum disorder than in control were Antepartum haemorrhage or threatened abortion, pregnancy induced hypertension (PIH). Significant perinatal and neonatal factorsfound were prematurity and pathological jaundice (Table-7).

Previously different studies found different types of associations. A. Ornoy *et al*., in their studies in 2015 found significant association with pregestational and/or gestational diabetes, maternal infections, prolonged fever and maternal inflammation [23]. Elizabeth Hisle-Gorman *et al*., in 2018 found association of ASD with maternal mental illness, epilepsy, obesity, hypertension, diabetes, polycystic ovary syndrome, infection, asthma, assisted fertility, hyperemesis, younger maternal age, labor complications, low birth weight, infant infection, epilepsy, birth asphyxia, and new born complications [24]. In studies by Imen Hadjkacem *et al.*, perinatal factors associated with ASD were acute fetal distress, prolonged labor and prematurity, while postnatal factors were respiratory infections [25]. S Nath *et al*., in 2012 found Pregnancy induced hypertension, Antenatal hemorrhage in first trimester, prematurity to have significant association with autism [26].

CONCLUSION

Autism is a multifactorial disorder of which many factors are preventable, especially antenatal and perinatal factors. From our study we have drawn the following conclusion-

- Male-female ratio among autistic children was 3:1
- Two thirds of the children came from urban area and majority of them resided in nuclear families.
- Both parents of most children were educated at least up to primary level. One third of them were graduates or post graduates.
- Families of autistic children were more or less evenly distributed among all social classes.
- Antenatal, Perinatal and neonatal factors found to be significantly associated with Autism were antepartum haemorrhage or threatened abortion, pregnancy induced hypertension, prematurity and pathological jaundice.

REFERENCES

1. Elsabbagh, M., Divan, G., Koh, Y. J., Kim, Y. S., Kauchali, S., Marcín, C., ... & Yasamy, M. T. (2012). Global prevalence of autism and other pervasive developmental disorders. *Autism research*, *5*(3), 160-179.
2. Bertrand, J., Mars, A., Boyle, C., Bove, F., Yeargin-Allsopp, M., & Decoufle, P. (2001). Prevalence of autism in a United States population: the Brick Township, New Jersey, investigation. *Pediatrics*, *108*(5), 1155-1161.
3. Hallmayer, J., Cleveland, S., Torres, A., Phillips, J., Cohen, B., Torigoe, T., ... & Lotspeich, L. (2011). Genetic heritability and shared environmental factors among twin pairs with autism. *Archives of general psychiatry*, *68*(11), 1095-1102.
4. Froehlich-Santino, W., Tobon, A. L., Cleveland, S., Torres, A., Phillips, J., Cohen, B., ... & Smith, K. (2014). Prenatal and perinatal risk factors in a twin study of autism spectrum disorders. *Journal of psychiatric research*, *54*, 100-108.
5. Gardener, H., Spiegelman, D., & Buka, S. L. (2011). Perinatal and neonatal risk factors for autism: a comprehensive meta-analysis. *Pediatrics*, *128*(2), 344-355.
6. Tchaconas, A., & Adesman, A. (2013). Autism spectrum disorders: a pediatric overview and update. *Current opinion in pediatrics*, *25*(1), 130-143.
7. Hisle-Gorman, E., Susi, A., Stokes, T., Gorman, G., Erdie-Lalena, C., & Nylund, C. M. (2018). Prenatal, perinatal, and neonatal risk factors of autism spectrum disorder. *Pediatric research*, *84*(2), 190-198.
8. Davis, E., Fennoy, I., Laraque, D., Kanem, N., Brown, G., & Mitchell, J. (1992). Autism and developmental abnormalities in children with perinatal cocaine exposure. *Journal of the National Medical Association*, *84*(4), 315-319.
9. Ornoy, A., Weinstein-Fudim, L., & Ergaz, Z. (2015). Prenatal factors associated with autism spectrum disorder (ASD). *Reproductive toxicology*, *56*, 155-169.
10. Hisle-Gorman, E., Susi, A., Stokes, T., Gorman, G., Erdie-Lalena, C., & Nylund, C. M. (2018). Prenatal, perinatal, and neonatal risk factors of autism spectrum disorder. *Pediatric research*, *84*(2), 190-198.
11. Khairnar, M., Wadgave, U., & Shimpi, P. (2016). Updated BG Prasad socioeconomic classification for 2016. *Journal of Indian Association of Public Health Dentistry*, *14*(4), 469-470.
12. Fombonne, E. (2009). Epidemiology of pervasive developmental disorders. *Pediatric research*, *65*(6), 591-598.

13. Jacquemont, S., Coe, B. P., Hersch, M., Duyzend, M. H., Krumm, N., Bergmann, S., ... & Eichler, E. E. (2014). A higher mutational burden in females supports a "female protective model" in neurodevelopmental disorders. *The American Journal of Human Genetics*, *94*(3), 415-425.
14. Lauritsen, M. B., Astrup, A., Pedersen, C. B., Obel, C., Schendel, D. E., Schieve, L., ... & Parner, E. T. (2014). Urbanicity and autism spectrum disorders. *Journal of autism and developmental disorders*, *44*(2), 394-404.
15. Raina, S. K., Chander, V., Bhardwaj, A. K., Kumar, D., Sharma, S., Kashyap, V., ... & Bhardwaj, A. (2017). Prevalence of autism spectrum disorder among rural, urban, and tribal children (1–10 years of age). *Journal of neurosciences in rural practice*, *8*(3), 368-374.
16. Gita, M. (2013). Autism spectrum disorder. Vellore MD. Updated 2013 October 29. Cited 2019 March 12. Available from: *velloremd.blogspot.com/2013/10/*autism-spectrum-disorder.*html.*
17. Turner, T., Pihur, V., & Chakravarti, A. (2011). Quantifying and modeling birth order effects in autism. *PloS one*, *6*(10), e26418.
18. Jon, H. (2010). Autism 'Clusters' Linked to Parents' Education Children's Health. Updated 2010 January 6; cited 2019 March 12. Available from: https://www.npr.org/templates/story/story.php?storyId=122256276
19. Himanshu, S. (2014). Only my health editorial team. Children of parents in technical jobs at higher risk for autism. Science News. *Source:* University of Texas Health Science Center at Houston, Study Links Autism to Parental Occupation May 19, 2014.
20. Delobel-Ayoub, M., Ehlinger, V., Klapouszczak, D., Maffre, T., Raynaud, J. P., Delpierre, C., & Arnaud, C. (2015). Socioeconomic disparities and prevalence of autism spectrum disorders and intellectual disability. *PLoS One*, *10*(11), e0141964.
21. Wing, L. (1980). Childhood autism and social class: a question of selection?. *The British Journal of Psychiatry*, *137*(5), 410-417.
22. Chinawa, J. M., Manyike, P. C., Aniwada, E. C., Chinawa, A. T., Obu, H. A., Odetunde, O. I., ... & Ibekwe, R. R. (2016). Prevalence and socioeconomic correlates of autism among children attending primary and secondary schools in south east Nigeria. *African health sciences*, *16*(4), 936-942.
23. Ornoy, A., Weinstein-Fudim, L., & Ergaz, Z. (2015). Prenatal factors associated with autism spectrum disorder (ASD). *Reproductive toxicology*, *56*, 155-169.
24. Hisle-Gorman, E., Susi, A., Stokes, T., Gorman, G., Erdie-Lalena, C., & Nylund, C. M. (2018). Prenatal, perinatal, and neonatal risk factors of autism spectrum disorder. *Pediatric research*, *84*(2), 190-198
25. Hadjkacem, I., Ayadi, H., Turki, M., Yaich, S., Khemekhem, K., Walha, A., ... & Ghribi, F. (2016). Prenatal, perinatal and postnatal factors associated with autism spectrum disorder. *Jornal de pediatria*, *92*(6), 595-601.
26. Nath, S., Roy, R., & Mukherjee, S. (2012). Pernatal complications associated with autism. *Journal Indian Medical Assertion*, 110(8):526-529.