

A Study of the Prevalence of Risk Factors Associated with Autism Spectrum Disorder Among Affected Individuals in Tehran

KATAYOON RAZJOUYAN¹, NAZGOL ETEMADI*², MOHAMMAD ALI MIRI³

¹Department of Child and Adolescent Psychiatry, ShahidBeheshti University of Medical Sciences

²Shahid Beheshti University of Medical Sciences, Tehran, Iran

³Iran Autism Association, Tehran, Iran

Correspond to author: nazgolii_etemadi@yahoo.com

ABSTRACT

Background: Autism spectrum disorder is a complex and multifactor neurodevelopmental disorder, in which the interaction between environmental and genetic factors is considered to be the main mechanism of its occurrence. Therefore, investigating the important environmental factors during pregnancy, childbirth and neonatal can be helpful in early detection of this disorder and initiation of rehabilitation measures.

Objective: The present study aimed to investigate the prevalence of autism spectrum risk factors in Iranian patients.

Methods: This article is a descriptive one. The target population consisted of all individuals with an autism spectrum disorder in Tehran. Totally, a sample of 1134 individuals with autism were selected. Primary questionnaires developed by Iran Autism Association were used for families in this study, and SPSS V21 software was used for descriptive analysis and frequencies of the data.

Results: The results of this study showed that the highest prevalence of risk factors related to autism spectrum disorder was male gender (79.2%), followed by parental education up to diploma in fathers (34.5%) and mothers (38.8%), cesarean delivery (66.5%), being the first child (54.7%), and early symptoms of jaundice (41%).

Conclusion: As a result, given to the role of factors such as fetal gender, type of delivery and parental education in autism spectrum disorder, there is a need to develop and provide educational programs for families and those couples who plan to have a child, and to pay more attention to the birth-related symptoms associated with autism (e.g. jaundice) in screening programs.

INTRODUCTION

Autism spectrum disorder is a neurodevelopmental disorder characterized by two main features of persistent impairment in bilateral communication and social interactions, and repetitive and limited patterns in behaviors, interests or activities^{1,2}. Autism symptoms in the affected population vary in severity and composition from a person to another, in fact, this disorder known as a spectrum in which symptoms vary from mild to severe during one's lifetime¹. The disorder is often lifelong^{1,2,3}, and can be usually detected by the third year of birth, at which time the recurrent and restricted patterns of behavior becoming more and more obvious⁴, although it may be detected by the second year of birth when delayed language development is found as the first symptom of this disorder². According to the World Health Organization (WHO), the prevalence of autism in 2018 was 1 per 160 people³, while this rate was 1 per 150 people in Iran. The prevalence of this disorder has increased from 6026 in 2012 to 95.2 per 10,000 in 2015⁵.

Autism is a complex disorder¹. Although its etiology remained unknown, most studies have emphasized that a single factor does not lead to the disorder, and it is likely to be a multifactorial disorder, so that a number of factors, including environmental and genetic factors, increase the likelihood of developing autism in a child. In fact, the interaction between a variety of sensitive genes and environmental factors is considered to be the underlying mechanism of autism^{1,6,7,8,9}, in a way that the occurrence of any symptoms may depend on the time of exposure to environmental factors or genetic susceptibility to specific environmental stimuli in prenatal (pregnancy), at birth

(childbirth), and postnatal (infancy) periods, and to contact with the various environmental factors during these critical time periods, such as the age, education of parents, the clinical circumstances of the mother during pregnancy, birth symptoms, weight and gender have been the focus of many epidemiological studies^{6,10,11,12,13,14}.

With regards to the increasing prevalence of autism, the lifelong impact of this disorder, and its heavy economic and social burdens on the family, it is important to prevent this disorder. While the cause of this disorder remained unknown, it may be possible to identify its risk factors by examining the environmental factors that along with genetic factors increase the risk of the disorder, and based of which certain prevention and management programs designed for it, so that parents use them to lower the risk of having a child with autism spectrum disorder through not exposing a number of these factors, and trying to provide appropriate conditions during sensitive maternal pregnancy¹. Moreover, early recognition of the symptoms and associated comorbidities and using them to screen for these children allows for early detection and intervention, thus minimizing their disability in the future and throughout their lives^{4,2}, so that they can experience the same family-independent lifestyle as others. Since no epidemiological study has been conducted to describe the prevalence of known risk factors associated with this disorder in Iran and also the small size of samples, We decided to conduct a preliminary study aimed to investigate the prevalence of risk factors associated with autism spectrum disorder in Tehran, hoping that the results of this study may be used to prevent and control the prenatal risk factors and policies needed to screen these children at an early age.

METHODS

This article is a descriptive (retrospective) one. The target population consisted of all individuals with an autism spectrum disorder in Tehran, of which, a sample consisting 1134 individuals with autism spectrum disorder registered in the Iranian Autism Society in Tehran from August 2015 to August 2016 were selected, who their autism were diagnosed by a child psychiatrist or pediatric neurologist.

MATERIALS AND METHODS

In this study, the registration form of the Iran Autism Association, including demographic data of children and their families, their primary symptoms at birth, the age of diagnosis with autism, primary symptoms of the disorder and associated morbidities, rehabilitation conditions, and occupational therapy was investigated. Variables identified as the risk factors and disorders associated with autism in previous literature reviews and are also available in this form were specified. Next, the data were collected using the registration form for people with autism who were registered in the Iran Autism Association between August 2015 and August 2016. SPSS V21 software was used to analyze the collected data. Frequency and percentage reported for descriptive analysis of qualitative variables, and mean and standard deviation for quantitative variables.

Ethical considerations: The implementation of the project was consistent with the beliefs and traditions of the community. Honesty and trustworthiness were maintained in reviewing the sources and articles listed in the references. All information related to studied individuals is kept confidential. The findings and results of the present study have been made available to stakeholders and published in coordination with them.

RESULTS

The present study was performed on 1134 people with autism spectrum disorder registered in the Iran Autism Association from August 2015 to August 2016. The results showed that out of 1134 participants, 899 were male (79.2%) and 235 were female (20.8%). The mean age of patients with autism was 12.6 years, and the mean age of autism diagnosis was 3.097 years (standard deviation 3.6). The results for education showed that in fathers 216 were under diploma, 391 diploma, 77 higher diploma, and 369 bachelor and above while 81 did not respond, and in mothers, 191 were under diploma, 440 diploma, 73 higher diploma, 346 bachelor and above, and 84 did not respond. The mean age of parents at birth of child with autism was 30.3 (standard deviation 10.26) for fathers, and 26.01 (standard deviation 9.23) for mothers, of which 316 parents had family marriages, 168 had married with a first-degree relative (14.8%), and 137 had married with a second-degree relative (12.1%). A history of autism in the family was negative in 914 cases, but positive in 131 cases, of which 67 cases occurred in the family of autistic people, and 64 cases in the relatives. Most of the patients with autism were the firstborn (54.7%) and the second-born (27.7%) children. There were a totally 34 twins, of which in 7 cases both children had autism.

Table 1: Frequency distribution of education level among fathers of the studied patients

Education level	Frequency	Percent
Under diploma	216	19.1
Diploma	391	34.5
Higher diploma	77	6.8
Bachelor and higher	369	32.5
Non-responding	81	7.1
Total	1134	100

The results of Table 1 show that most of the fathers of autistic children have a diploma, followed by bachelor and higher, under diploma, and higher diploma.

Table 2: Frequency distribution of education level among mothers of the studied patients

Education level	Frequency	Percent
Under diploma	191	16.9
Diploma	440	38.8
Higher diploma	73	6.4
Bachelor and higher	346	30.5
No response	84	7.4
Total	1134	100

The results of Table 2 show that most of the fathers of autistic children have a diploma, followed by bachelor and higher, under diploma, and higher diploma.

Table 3: Frequency distribution of pregnancy duration in the mothers of the studied patients

Pregnancy duration	Frequency	Percent
Less than 37 weeks	213	18.8
37 to 41 weeks	644	56.8
42 weeks and over	100	8.8
No response	177	15.6
Total	1134	100

The results of Table 3 show that the majority of mothers had normal gestation with term childbirth, followed by preterm and post-term childbirths. (Term: 37 to 41 weeks; Pre-term: Less than 37 weeks; Post-term: 42 weeks and over)

Table 4: Frequency distribution of birth weight

Birth weight	Frequency	Percent
Normal	870	76.7
Abnormal	128	11.3
No response	136	12
Total	1134	100

The results of Table 5 show that the most type of delivery has been through cesarean. (Normal weight: 2500 to 4500 grams; abnormal weight: less than 2500, or more than 4500)

Table 5: Frequency distribution of delivery types in mothers of the studied patients

Delivery type	Frequency	Percent
Normal	282	25.7
Cesarean	754	66.5
No response	88	7.8
Total	1134	100

The results of Table 5 show that the most type of delivery has been through cesarean.

Table 6: Frequency distribution of at birth symptoms

Symptom	Jaundice	Bruising	Crying	Bruising & jaundice	Crying & bruising	Crying & jaundice	All symptoms	No symptom	Total
Frequency	464	52	52	23	18	21	17	487	1134
Percent	41	5.4	5.4	2	6.1	9.1	5.1	43	100

The results of Table 6 show that the most presenting at birth symptom was jaundice with a frequency of 464, followed by bruising and crying each with a frequency of 52.

DISCUSSION

The present study aimed to investigate the prevalence of autism spectrum risk factors in autistic patients of Tehran. Risk factors associated with autism spectrum disorder were evaluated and classified in three categories of pregnancy-related factors, at the time of delivery, and during the neonatal period. In the cases related to pregnancy period, of the 1134 affected cases, 899 were boys (79.2%) and 235 were girls (20.8%), showing a 4 fold prevalence of autism in boys compared to girls. Accordingly, the male gender can be considered as a potential risk factor for autism disorder. This is consistent with the findings of DSMV², Werling and Geschwind⁶, King and Bearman¹⁶, Kogan et al¹⁷, Finegan and Quarrington¹⁸, Williams et al¹⁹ and Hashemi et al¹⁰.

In this study, the number of parents with a high school diploma was higher than those with a bachelor's degree or higher, which is consistent with the study of Kogan et al. who reported that the chance of having an autistic child is lower in mothers with college education compared to those only completed high school¹⁷. The results for the age of parents showed a mean age of 33 years and 3 months for fathers and 26 years for mothers which is in line with the studies of Gardener et al¹², Wu et al²⁰, Durkin et al²¹, Karimi et al⁷, and Hashemi et al¹⁰. However, Larsson et al. found no statically significant relationship between parentage and the possibility of autism²². Also, in the study by Hashemi et al., no significant relationship was found between birth order and autism¹. However, in our study, the first offspring accounted for more than half of the affected children with autism (54.7% in the first and 27.7% in the second children). This is consistent with the study of Glasson et al¹¹.

In terms of having a family history of autism, the results of this study were consistent with the study by Hashemi et al., in which no significant relationship was found between having a positive family history and the possibility of autism. However, the frequency of family marriage in our study was less than that of non-family marriage which is in contrast with the study of Hashemi et al¹.

Among the factors related to the time of delivery, cesarean delivery was more prevalent than normal delivery in autism association of Tehran, which is consistent with the study of Gardner et al¹² on prenatal risk factors, the descriptive-analytical study by Hashemi et al¹⁰, the review study by Karimi et al⁷, and the study by Glasson et al¹¹. Accordingly, given the overall increase in the rate of cesarean delivery in recent years in Iran, this can be considered as a risk factor of autism. With regards to preterm labor, the results of this study were inconsistent with those of Josef²⁴, Buchmayer², Larson²², Mamidala²⁵ and Karimi¹.

According to the results of this study on factors associated with infancy, it is important to consider at-birth symptoms and the associated disorders by parents and health professionals. The findings of this study also showed that jaundice has been widely reported in autistic children at their first days of birth, which is consistent with research by Mamidala et al., and Karimi et al. (22 and 26). However, it is unclear that whether this disorder has caused autism in children or the fetus with autism is more vulnerable to jaundice. In our study, most children with autism had normal birth weights, which is in contrast to the findings of Josef (24), Buchmayer (23), Larson (22), Mamidala (25), and Karimi et al. who considered low birth weight as a risk factor of autism.

Hence, based on the results of this study and comparing them with other similar studies, it can be concluded that autism is a multifactorial phenomenon, in which both environmental and hereditary factors are effective in increasing the risk of it. Accordingly, multifaceted planning considering the role of all factors involved is needed to reduce the autism dimensions and the number of cases observed in society. As a result, given to the role of factors such as fetal gender, type of delivery and parental education in the findings of this study, there is a need to develop and provide educational programs for families and those couples who plan to have a child, and to pay more attention to the birth-related symptoms associated with autism in screening programs, in order to alleviate the severe economic and social pressures on the families of autistic children, reduce the symptoms of this disorder, and prevention from worsening of their condition in adulthood.

CONCLUSION

The results of the present study showed that it is important to consider the environmental factors related to pregnancy, childbirth and neonates which have a high rate of comorbidity in autism disorder when initiating early measures to receive diagnosis and rehabilitation services. Providing information on this plan to organizations involved with autistic children, especially hospitals, maternity and health centers can help early detection of this disorder and increase the awareness of families to earlier identification and diagnosis of the disorder. In this regard, providing families with adequate information about the autism spectrum disorder allows them to think and act more quickly to improve their child's skills. NGOs, clinics, and therapists need to know that autism is not a separate disorder, and to focus more on the process of implementing various rehabilitation and treatment plans to control their severity so that they can more accurately address communication and social skills training.

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