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Prevalence of Autism and its Comorbidities and the Relationship with Maternal Psychopathology: A National Population-Based Study

Mohammad Reza Mohammadi, MD[1]; Nastaran Ahmadi, PhD[2]; Ali Khaleghi, PhD[1]; Hadi Zarafshan, PhD[1*]; Seyed-Ali Mostafavi, PhD[1]; Koorosh Kamali, PhD[3]; Mehdi Rahgozar, PhD[4]; Ameneh Ahmadi, MSc[1]; Zahra Hooshyari, PhD[1]; Seyyed Salman Alavi, PhD[1]; Alia Shakiba, MD[1]; Maryam Salmanian[1]; Parviz Molavi, MD[5]; Nasrin Sarraf, MD[6]; Seyed Kaveh Hojjat, MD[7]; Soleiman Mohammadzadeh, MD[8]; Shahrokh Amiri, MD[9]; Soroor Arman, MD[10]; Ahmad Ghanizadeh[11]

[1]Psychiatry and Psychology Research Center, Tehran University of Medical Sciences, Tehran, Iran
[2]Yazd Cardiovascular Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[3]Department of Public Health, School of Public Health, Zanjan University of Medical Sciences, Zanjan, Iran
[4]Department of Biostatistics, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran
[5]Department of Psychiatry, Fatemi Hospital, Ardabil University of Medical Science, Ardabil, Iran
[6]Department of Child and Adolescent psychiatry, School of Medicine, Qazvin University of Medical Sciences, Qazvin, Iran
[7]Addiction and Behavioral Sciences Research center, North Khorasan University of Medical Sciences, Bojnurd, Iran
[8]Department of Psychiatry, Neuroscience Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran
[9]Research Center of Psychiatry and Behavioral Sciences, Tabriz University of Medical Sciences, Tabriz, Iran
[10]Behavioral Sciences Research Center, Isfahan University of Medical Sciences, Isfahan, Iran
[11]Department of Psychiatry, Hafez Hospital, Shiraz University of Medical Sciences, Shiraz, Iran

Abstract

Background: There is no clear picture regarding the prevalence rates of autism and its comorbidities among Iranian children and adolescents. The present study aimed to estimate these rates as part of a large national population-based study on epidemiology of psychiatric disorders in Iranian children and adolescents.

Methods: The total sample consisted of 31 000 children and adolescents between 6 to 18 years of age. The Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Present and Life time version (K-SADS-PL) was used as the diagnostic tool.

Results: The prevalence of autism in the total sample is equal to 0.1% (10 per 10 000), with a 2:1 male-to-female ratio. In total, 86% of people with autism had at least one comorbid condition. Intellectual disability, epilepsy, enuresis and attention deficit and hyperactivity disorder (ADHD) with prevalence rates of 70.3%, 29.7%, 27% and 21.62%, respectively, were the most prevalent comorbid conditions in people with autism. Maternal personality disorders were also shown to be associated with increasing risk of autism.

Conclusion: The present study shows high prevalence rates for autism and its comorbid conditions among Iranian children and adolescents. It also reveals that there is a relationship between some maternal psychiatric disorders and the risk of autism.

Keywords: Autism, Attention deficit-hyperactivity disorder, Comorbidity, Epilepsy, Intellectual disability, Prevalence

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Introduction

Autism spectrum disorder (ASD) is a severe neurodevelopmental disorder characterized by deficits in social and communication skills as well as restricted and repetitive behaviors.[1] Its prevalence has risen dramatically in recent years; for example, its prevalence in the United States was reported at 0.67% in 2000, 1.47% in 2010 and 2.58% in 2016.[2] Some researchers argue that improvement in diagnostic methods and changes in definition have contributed to this rise to some extent. Most rigorous studies to determine the prevalence of ASD have been conducted in developed countries. In Iran, as a low and middle-income country, the prevalence rate of autism has been investigated in only few studies. The first study was published in 2008. In this school-based study, 2000 school-aged children were randomly selected from typical schools in Shiraz. A parent report rating scale based on the Diagnostic and Statistical Manual of Mental Disorders-IV-TR (DSM-IV-TR) criteria of pervasive developmental disorders (PDD) symptoms was used. The results showed that about 1.9% and 0.5% of the sample were screened positive for probable autistic disorder and probable

***Corresponding Author:** Hadi Zarafshan, PhD; Department of Autism and Neurodevelopmental Disorders, Psychiatry and Psychology Research Center, Roozbeh Hospital, Tehran University of Medical Sciences, Tehran, Iran. Tel: +989127967889, Fax: +98-21-55421959, Email: zarafshan84@gmail.com.

Asperger's disorder, respectively.[3] In another study, the obtained data from the Iranian national screening program for special needs was explored to estimate the prevalence of autism among five-year-old children. This study showed the prevalence of typical autism at 6.26 per 10 000. The results of this study were limited to only five-year-old children and typical autism.[4]

Comorbid psychiatric and medical conditions are common in people with ASD and make it more complicated to manage[5-8] and drastically influence the progress and outcomes of this disorder.[9] Structured diagnostic interviews have shown that more than 70% of children with ASD have at least one comorbid disorder.[10] Intellectual disability, epilepsy and ADHD are the most common comorbidities in people with ASD.[11] It has been reported that age and sex have some impact on the prevalence rate of comorbidities; ADHD is more common among males[11] and epilepsy is more common among females.[12,13] Also, it has been reported that the prevalence of schizophrenia increased with age.

In Iran, there is only one published study on comorbid conditions among children with autism. This study had a small sample size (n = 91) and only included children from five special schools for autistic students located in Tehran, the capital of Iran.[14] Nevertheless, this study showed that 72% of participants had at least one comorbid condition, and attention-deficit/hyperactivity disorder and epileptic disorders were the most prevalent comorbid conditions among students with autism.

Also, it has been shown that the relatives of people with autism, especially their parents, are at higher risk of experiencing psychiatric disorders.[15,16] For example, studies using semi-structured psychiatric interviews reveal that 20 to 37% of the relatives of people with autism have had a life time history of major depression.[17] A recent population-based study also showed that psychiatric disorders are more common in parents of children with autism; higher risk of autism among children was associated with diagnosis of schizophrenia in both parents, depression in mothers, and neurotic and personality disorder and other nonpsychotic disorders.[18] Most researchers believe that this association means that there are common genetic/familial factors between autism and other psychiatric disorders and also that genetic factors underlie autism.[16]

In the current study, using data retrieved from a large-sample population-based study,[19] we aimed to estimate the prevalence of autism, its comorbidities and the role of parental psychiatric disorders in increased risk of autism among Iranian children and adolescents.

Materials and Methods

Participants and Sampling

This study is part of a large-sample national population-based study on the epidemiology of psychiatric disorders among Iranian children and adolescents. It was a cross-sectional study on children and adolescents aged 6 to 18 years and was implemented in all provinces of Iran. Assuming a prevalence of psychiatric disorders equal to 0.3, type one error of 0.05 and accepted error of 0.05, the sample size for each province was calculated equal to 825. We suggested the design effect for cluster sampling as 1.2; so, the final sample size in each province increased to 990 (1000). The total sample size amounted to 31 000. The sample was selected randomly using multistage cluster sampling method based on postal codes of houses. Our sampling frame was all Iranian citizen aged 6 to 18 years who lived in either urban or rural areas in each province. We randomly selected 170 clusters of houses in each province and each cluster included six children and adolescents between 6 to 18 years of age. In sum, we selected about 1.000 cases from each province, except Tehran, the most crowded province of Iran, where we selected 340 clusters and around 2000 cases.

Survey analysis was used in the Stata software and clustering was applied but the selection of clusters and samples in clusters were random; we expected that the samples' selection probabilities were equal and our results confirm. We were strict in interpreting the results and have interpreted the *P* values above 0.01 and below 0.05 cautiously.

As mentioned, the number of people who were selected as sample for this study was equal in all provinces. However, the population of children and adolescence is not equal in all provinces; hence, the data were weighted to represent the population. We used the population weighting adjustment based on the population distribution of children and adolescents in each province according to the formula below. Stata software was used for all data analysis.

$$Wij = \frac{1}{Pij * 1000} * 100$$

Wij: Weight of individual in each province;
Pij: Probability of individual selection in their province

More detailed information regarding the methodology of the main study has been provided in its published protocol.[20]

Instruments

Demographic data (gender, age, education, parents' education, and economic status) was gathered using a questionnaire designed by the investigators.

To identify the children and youth who had symptoms of autism, the autism section of the new Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Present and Life time version (K-SADS-PL-2009)[21] was used. To investigate comorbid psychiatric disorders, the K-SADS-PL was used.[22] Some additional questions were used to detect Intellectual Disability and epilepsy.

We also used the Millon Clinical Multiaxial Inventory - Third Edition (MCMI-III) to assess parental personality

traits and psychopathology.[23]

All interviews were conducted by trained clinical psychologists.

Statistical Analysis

Descriptive statistic indices were used to obtain the prevalence data in terms of demographic variables. All the statistics on the prevalence of psychiatric disorders are also based on the weighted percentages (weighting based on the number of provincial samples) as well as crude percentages (without weight). We used post stratification weights to adjust the survey sample to the underlying population demographic structure. The weighted percentages were measured based on the population distribution of children and adolescents across the provinces according to the 2017 national census (1 weight was assigned to every one million people and the other weights were determined accordingly).

Results

Table 1 presents the demographic information of the total sample. In total, 49% of the sample were male and 51% were female, with an age range of 6 to 18 years. Of our participants, 83.3% lived in urban areas and 16.7% lived in rural areas (Table 1).

The prevalence of autism in the total sample was equal to 0.1% (10/10 000), with a 2:1 male-to-female ratio (Table 1). As seen in Table 1, there are no significant differences in the prevalence of autism based on the demographic variables.

As Table 2 and Figure 1 demonstrate, 86% of people with autism had at least one comorbid condition. Intellectual Disability, epilepsy, enuresis and ADHD with prevalence rates of 70.3%, 29.7%, 27% and 21.62%, respectively, were the most prevalent comorbid conditions among people with autism. There was some effect for sex on the rate of comorbid conditions; however, it was not statistically significant (see Table 2).

Only mothers of autistic cases filled out the Millon inventory. The relationship between mothers' personality disorders and clinical scales and the prevalence of autism is presented in Tables 3 and 4. Autism was more prevalent among children of mothers who fell in almost all of the diagnostic groups, but some of the differences were not statistically significant.

Discussion

As mentioned previously, there is no clear picture regarding

Table 1. Prevalence of Autism Disorder Based on Demographic Variables in Children and Adolescents

Demographic Variables			With Autism Disorder			Binary Logistic Regression		
		Total, No. (%)	*n* (Unweighted %)	95% CI	%Weighted (95% CI)	OR	95% CI	*P* Value
Sex	Boy	14567 (49)	22 (0.2)	0.1–0.23	0.23 (0.15–0.35)			Base line
	Girl	15170 (51)	15 (0.1)	0.06–0.16	0.11 (0.06–0.2)	0.65	0.34–1.26	0.21
Age group	6–9	10129 (34.1)	11 (0.1)	0.0 6–0.2	0.09 (0.04–0.2)			Base line
	10–14	10405 (35)	18 (0.2)	0.11– 0.27	0.29 (0.19–0.45)	1.59	0.75–3.37	0.23
	15–18	9203 (30.9)	8 (0.1)	0.05–0.18	0.09 (0.04–0.21)	0.80	0.32–1.99	0.63
Place of residence	Urban	24785 (83.3)	30 (0.1)	0.08–0.17	0.17 (0.12–0.25)			Base line
	Rural	4952 (16.7)	7 (0.1)	0.07–0.29	0.15 (0.05–0.43)	1.17	0.51-2.66	0.71
Father's education	Illiterate	1290 (4.5)	12 (0.2)	0.04–0.57	0.14 (0.02–0.79)		Base line	
	Elementary school	4610 (16.1)	6 (0.1)	0.06–0.28	0.23 (0.10–0.50)	0.84	0.17–4.16	0.83
	Middle & high school	6383 (22.3)	10 (0.2)	0.09–0.29	0.18 (0.09–0.37)	1.01	0.22–4.62	0.99
	Diploma	8340 (29.1)	9 (0.1)	0.06–0.21	0.16 (0.08–0.3)	0.69	0.15–3.22	0.64
	Bachelor	6053 (21.1)	7 (0.1)	0.06–0.24	0.08 (0.03–0.23)	0.75	0.15– 3.59	0.71
	MSc or higher	1966 (6.9)	2 (0.1)	0.03–0.37	0.39 (0.17–0.91)	0.66	0.09–4.66	0.67
	Missing	1095	1					
Mother's education	Illiterate	1694 (5.9)	1 (0.1)	0.01–0.34	0.1 (0.02–0.58)		Base line	
	Elementary school	5466 (18.9)	7 (0.1)	0.06–0.25	0.24 (0.12–0.50)	2.17	0.27–17.66	0.47
	Middle & high school	5645 (19.5)	7 (0.1)	0.06–0.25	0.06 (0.02–0.22)	2.10	0.26–17.10	0.49
	Diploma	9593 (33.1)	15 (0.2)	0.1–0.26	0.18 (0.01–0.32)	2.65	0.35-20.08	0.34
	Bachelor	5555 (19.2)	7 (0.1)	0.06–0.27	.27 (0.15–0.49)	2.14	0.26-17.37	0.48
	MSc or higher	986 (3.4)	-	-	-	-	-	-
	Missing	798						
Father job	Public sector	18443 (64.3)	13 (0.1)	0.08–0.24	0.17 (0.09–0.31)		Base line	
	Private sector	9270 (32.3)	20 (0.1)	0.07–0.17	0.13 (0.08–0.21)	0.73	0.38–1.55	0.47
	Unemployed	989 (3.4)	3 (0.3)	0.1–0.9	0.81 (0.35–1.88)	2.17	0.62–7.61	0.23
	Missing	1035	1					
Mother job	Public sector	1209 (4.2)	3 (0.1)	0.03–0.29	0.25 (0.11–0.59)		Base line	
	Private sector	3086 (10.6)	-	-	-	-	-	-
	Housewife	24751 (85.2)	34 (0.1)	0.1 - 0.2	0.17 (0.12–0.25)	1.41	0.43–4.6	0.57
	Missing	691						
	Total	**29737 (100)**	**37 (0.1)**	**0.09–0.17**	**0.18 (0.12–0.24)**			

Table 2. Rates of Comorbid Psychiatric Disorders in Children and Adolescents with Autism Disorder

Psychiatric Disorders		Total	Sex: Male (1), Female (2)			Age group: 6–9 (1), 10–14 (2), 15–18 (3)		
		No. (%) (CI)		No. (%)	OR (CI)		No. (%)	OR (CI)
Total disorders		32 (86) (72.03–94.9)	1	19 (86.4)	1 baseline	1	8 (80)	1 baseline
			2	13 (92.9)	2.05 (.19–21.97)	2	16 (88.9)	2.00 (.24–16.93)
						3	7 (86.5)	1.75 (.13–23.70)
Depressive		1 (2.7) (0.5–1.38)	1	1 (4.5)	1 baseline	1	0	1 baseline
			2	0	0	2	0	—
						3	1 (12.5)	—
Anxiety disorders	Separation anxiety disorder	5 (13.5) (5.91–27.97)	1	2 (9.1)	1 baseline	1	0	1 baseline
			2	3 (20)	2.5 (0.36–17.2)	2	4 (22.2)	—
						3	1 (12.5)	—
	Social phobia	7 (19) (9.5–34.21)	1	5 (23.8)	1 baseline	1	1 (9.1)	1 baseline
			2	2 (13.3)	0.49 (0.08–2.97)	2	5 (29.4)	4.17 (0.42–41.78)
						3	1 (12.5)	1.43 (0.08–26.89)
	Specific phobia	1 (2.7) (0.5–1.38)	1	0	1 baseline	1	0	1 baseline
			2	1 (6.7)	0	2	0	—
						3	1 (12.5)	—
	Agoraphobia	1 (2.7) (0.5–1.38)	1	0	1 baseline	1	0	1 baseline
			2	1 (6.7)	0	2	0	—
						3	1 (12.5)	—
	Generalized anxiety disorder	5 (13.5) (5.91–27.97)	1	4 (18.2)	1 baseline	1	0	1 baseline
			2	1 (7.1)	0.35 (0.03–3.5)	2	3 (16.7)	—
						3	2 (28.6)	—
	Obsessive compulsive disorder	5 (13.5) (5.91–27.97)	1	3 (13.6)	1 baseline	1	0	1 baseline
			2	2 (13.3)	0.97 (14–6.67)	2	2 (11.1)	—
						3	3 (37.5)	—
	Total anxiety disorders	10 (27) (15.4–42.98)	1	6 (27.3)	1 baseline	1	1 (9.1)	1 baseline
			2	4 (50)	1.39 (0.32–5.89)	2	6 (33.3)	4.91 (0.50–48.62)
						3	4 (50)	9 (0.75–108.3)
Behavioral Disorders	Attention deficit hyperactivity disorder	8 (21.6) (11.39–37.19)	1	7 (33.3)	1 baseline	1	3 (27.3)	1 baseline
			2	1 (6.7)	0.14 (0.01–1.32)	2	4 (23.5)	0.82 (0.14–4.66)
						3	1 (12.5)	0.38 (0.03–4.55)
	Conduct disorder	1 (2.7) (0.5–1.38)	1	1 (4.5)	1 baseline	1	0	1 baseline
			2	0	0	2	1 (5.6)	—
						3	0	—
	Oppositional defiant disorder	6 (16.2) (7.65–31.14)	1	4 (18.2)	1 baseline	1	1 (9.1)	1 baseline
			2	2 (13.3)	0.69 (0.11-4.36)	2	4 (22.2)	2.85 (0.28–29.56)
						3	1 (12.5)	1.43 (0.08–26.89)
	Tic disorder	3 (8.1) (2.8–21.3)	1	3 (13.6)	1 baseline	1	0	1 baseline
			2	0	0	2	3 (16.7)	—
						3	0	—
	Total behavioral disorders	11 (29.7) (17.49–45.78)	1	9 (40.9)	1 baseline	1	3 (27.3)	1 baseline
			2	2 (13.3)	0.21 (0.4–1.1)	2	7 (38.9)	1.87 (0.36–9.63)
						3	1 (12.5)	0.38 (0.03–4.55)
	Intellectual disability	26 (70.3) (54.22–82.51)	1	15 (68.2)	1 baseline	1	6 (54.5)	1 baseline
			2	11 (73.3)	1.28 (0.3–5.5)	2	13 (72.2)	2.17 (0.45–10.43)
						3	7 (87.5)	5.83 (0.52–64.82)
	Epilepsy	11 (29.7) (17.49–45.78)	1	8 (36.4)	1 baseline	1	2 (18.2)	1 baseline
			2	3 (20)	0.44 (0.09–2)	2	7 (38.9)	2.86 (0.47–17.35)
						3	2 (25)	1.50 (0.16–13.75)
	Total neurodevelopmental disorders	28 (75.7) (59.9–86.6)	1	17 (77.3)	1 baseline	1	7 (63.6)	1 baseline
			2	11 (73.3)	0.8 (0.18–3.6)	2	14 (77.8)	2 (0.38–10.48)
						3	7 (87.5)	4 (0.35–45.38)
Elimination Disorders	Enuresis	10 (27) (15.4–42.98)	1	7 (31.8)	1 baseline	1	3 (27.3)	1 baseline
			2	3 (20)	0.54 (0.11–2.5)	2	5 (27.8)	1.03 (0.19–5.50)
						3	2 (25)	0.89 (0.11–7.11)
	Encopresis	4 (10.8) (4.28–24.71)	1	2 (9.1)	1 baseline	1	1 (9.1)	1 baseline
			2	2 (13.3)	1.53 (0.2–12.3)	2	2 (11.1)	1.25 (0.1–15.65)
						3	1 (12.5)	1.43 (0.08–26.9)
	Total Elimination Disorders	10 (27) (15.4–42.98)	1	7 (31.8)	1 baseline	1	3 (27.3)	1 baseline
			2	3 (20)	0.54 (0.11–2.5)	2	5 (27.8)	1.03 (0.19–5.51)
						3	2 (25)	0.89 (0.11–7.11)

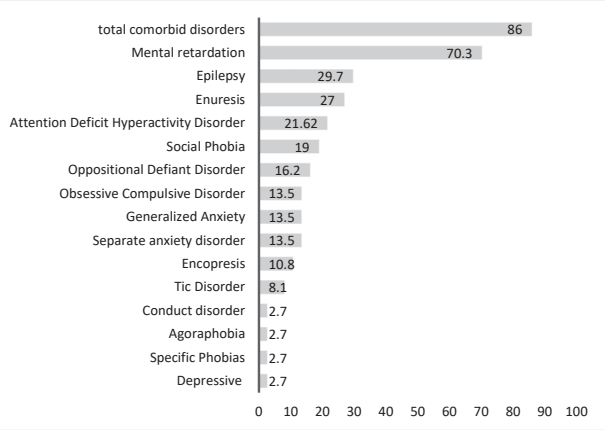

Figure 1. Rate of Comorbid Disorders in Autism Spectrum Disorder in Percent.

the prevalence of autism and its comorbidities among Iranian children and adolescents and the present study is the first national population-based study to address these issues.

Previous studies have shown heterogeneity in estimated prevalence of autism around the world; in a systematic review, its median was reported at 62 per 10 000.[24] The current study has estimated the prevalence of autism at 0.1% (or 10 per 10 000) in a large sample of Iranian children and adolescents. This rate is close to and in fact higher than the previously reported prevalence of typical autism in Iran (i.e. 6.26 per 10 000). Like previous studies, in this study, the prevalence rate is higher in male subjects compared to females (0.1% in females vs. 0.2% in males), although the difference is not statistically significant (OR: 0.65, CI: 0.34–1.26). However, the male-to-female ratio reported in this study (2:1) is lower than the results of previous studies (i.e. 3:1to 4:1).

Comorbid conditions were common in our sample; 86% (CI:72.03–94.9) of participants had at least one comorbid condition. Intellectual disability (MR) with 70.3% (CI: 54.22–82.51) was the most prevalent comorbidity. This high rate of MR among our ASD positive cases can explain the low prevalence rate of autism in the total sample; it seems that we only detected the severe cases of autism. Some researchers argue that the prevalence of MR is higher in female subjects with autism compared to male subjects; we found a similar pattern in our study (OR: 1.28, CI: 0.3–5.5).

A national survey on 85 248 children and adolescents aged between 2-17 years has shown that 8.6% of ASD cases had comorbid epilepsy,[25] while in our study, this rate was found to be 29.7% (CI: 17.49–45.78) of the ASD cases. In addition to the high prevalence of MR, this high rate of epilepsy compared with other similar studies reveals that our detected ASD cases fall in the range of severe symptoms.

Previous studies have shown that rates of enuresis in ASD cases are 2–16%.[26] We found this rate to be 27% (CI: 15.4–42.98) in our study. One important factor that increases enuresis in people with ASD is the adverse effect of medication.[26] Given the high prevalence of comorbid conditions in our sample, especially MR and epilepsy, these people were subject to taking more medications[27] and thus, some proportion of this co-occurring enuresis may be due to using medications.

Attention deficit and hyperactivity disorder (ADHD), with a prevalence of 21.62%, was the next common comorbid psychiatric disorder in our sample of ASD cases. This observation is in the range of the findings of previous similar studies.[27]

In our sample of children and adolescents with ASD, there were other comorbid conditions, including social phobia, oppositional defiant disorder, obsessive compulsive disorder, generalized anxiety, separation anxiety, encopresis, tic, conduct, agoraphobia, specific phobia and depression with prevalence rates of 19%, 16.2%, 13.5%, 13.5%, 13.5%, 10.8%, 8.1%, 2.7%, 2.7%, 2.7% and 2.7%, respectively. This large number and variety of comorbid conditions should be considered in planning therapeutic programs for children with autism. These can adversely affect the outcomes of interventions and can also complicate the management of the child's behaviors.

Some studies have revealed sex differences in comorbid conditions among children with autism. For example, it has been shown that ADHD is more common in males compared to females.[11] Our study also showed these sex differences; however, they were not statistically significant. For example, ADHD was more prevalent in male participants (odds ratio [OR]: 0.14, CI: 0.01–1.32) while separation anxiety was more prevalent in females (OR: 2.5, CI: 0.36–17.2). We also found some differences between age groups (i.e. 6–9, 10–14 and 15–18 years) regarding comorbidities. Anxiety disorders (OR: 4.91, CI: 0.50–48.62, OR: 9, CI: 0.75–108.3) and neurodevelopmental disorders (OR: 2, CI: 0.38–10.48, OR: 4, CI: 0.35–45.38) were more prevalent in older age groups. This pattern can be explained by the fact that people with autism are going to be more deprived with increasing age and will feel more anxious facing the pressure of increasing social demands. Behavioral disorders increased in middle childhood (OR: 1.87, CI: 0.36–9.63) and then decreased (OR: 0.38, CI: 0.03–4.55). Importantly, it should be noted that due to the small number of ASD cases and wide range of confidence intervals, this finding should be considered with caution.

As seen in Tables 3 and 4, maternal personality disorders were associated with increasing risk of autism. This association was statistically significant among mothers who were at risk of schizoid (OR: 5.25, CI:1.25–22.03), melancholic (OR: 3.33, CI: 1.28–8.66) and persistent depression (OR: 5.12, CI: 1.55–16.85) and also those who were diagnosed with schizoid (OR: 21.86, CI: 2.91-164.04) and posttraumatic stress disorder (OR: 10.14, CI:1.37–

Table 3. Odds Ratios (95% CI) for Children and Adolescents with Autism Disorders Based on Maternal Personality Disorders

	Maternal Personality Disorders	Diagnostic Labels	Children with Autism disorders, No. (%)	Univariate		Multivariate	
				OR (CI 95%)	*P* Value	OR (95% CI)	*P* Value
Clinical pattern of personality disorders	Schizoid	No	31 (0.1)	Baseline			
		At risk	2 (0.6)	5.25 (1.25–22.03)	0.023	4.56 (0.92–22.62)	0.063
		Yes	1 (2.4)	21.86 (2.91–164.04)	0.003	18.58 (1.73–20.05)	0.016
	Avoidant	No	33 (0.1)	Baseline			
		At risk	1 (0.4)	3.38 (0.46–24.79)	0.24	1.23 (0.13–11.88)	0.861
		Yes	0	—	—	—	—
	Melancholic	No	27 (0.1)	Baseline			
		At risk	5 (0.4)	3.33 (1.28–8.66)	0.014	2.66 (0.94–7.58)	0.067
		Yes	2 (0.2)	1.54 (0.37–6.49)	0.56	0.69 (1.08–4.469)	0.701
	Dependent	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	0	—	—	—	—
	Histrionic	No	26 (0.1)	Baseline			
		At risk	5 (0.1)	0.95 (0.36–2.48)	0.92	1.11 (0.42–2.93)	0.842
		Yes	3 (0.1)	0.80 (0.24–2.63)	0.71	0.94 (0.28–3.19)	0.926
	Narcissistic	No	33 (0.1)	Baseline			
		At risk	1 (0.1)	0.71 (0.1–5.18)	0.73	0.62 (0.08–4.62)	0.640
		Yes	0	—	—	—	—
	Anti-social	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	—	—	—	—	—
	Sadistic	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	0	—	—	—	—
	Obsessive compulsive	No	24 (0.1)	Baseline			
		At risk	3 (0.1)	1.20 (0.36–3.99)	0.76	1.16 (0.35–3.87)	0.809
		Yes	7 (0.1)	1.26 (0.54–2.94)	0.58	1.26 (0.54–2.95)	0.592
	Negativistic	No	31 (0.1)	Baseline			
		At risk	3 (0.3)	2.34 (0.71–7.68)	0.16	1.24 (0.29–5.25)	0.775
		Yes	0	—	—	—	—
	Masochistic	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	0	—	—	—	—
Severe Personality Pathology scales	Schizotypal	No	33 (0.1)	Baseline			
		At risk	1 (0.6)	5.01 (0.68–36.85)	0.12	2.27 (0.21–24.73)	0.501
		Yes	0	—	—	—	—
	Borderline	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	0	—	—	—	—
	Paranoid	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	0	—	—	—	—

75.03). This finding is in line with the results of previous studies conducted in other countries. A population-based study in Sweden[28] reported that schizophrenia was more common among both parents of children with autism, in comparison to non-autistic children. However, depression and personality disorders were more prevalent only among mothers of children with autism. Another population-based study in Finland investigated the relationship between parental psychiatric disorders and the risk of ASD in children based on its subgroups (i.e. childhood autism, Asperger syndrome and PDD-NOS).[18] This study showed that there was a relationship between increased risk of ASD and the presence of maternal and paternal schizophrenia, affective disorders, neurotic and personality disorders and other nonpsychotic disorders. However, there are some differences between maternal and paternal effects among ASD subgroups. Paternal schizophrenia, affective disorders, and neurotic and personality disorders were associated with risk of childhood autism, whereas only maternal affective disorders were associated with that risk. Also, Asperger syndrome was associated with schizophrenia, affective disorders, neurotic and personality disorders and other nonpsychotic disorders in mothers and affective disorders, neurotic and personality disorders and other nonpsychotic disorders in fathers. PDD-NOS was also associated with all parental psychiatric disorders. In summary, this observed

Table 4. Odds Ratios (%95 CI) for Children and Adolescents with Autism Disorders Based on Maternal Clinical Scale

	Mother Personality Disorders	Diagnostic Labels	Children with Autism Disorders, No. (%)	Univariate		Multivariate	
				OR (95% CI)	*P* Value	OR (95% CI)	*P* Value
Clinical Syndrome Scales	Anxiety	No	33 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	1 (0.4)	3.13 (0.43–22.96)	0.26	1.13 (.07–18.59)	.932
	Somatoform	No	32 (0.1)	Baseline			
		At risk	2 (0.5)	3.89 (0.93–16.29)	0.063	1.62 (.27–9.68)	.597
		Yes	0	—	—	—	—
	Bipolar spectrum	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	0	—	—	—	—
	Persistent Depression	No	29 (0.1)	Baseline			
		At risk	3 (0.6)	5.12 (1.55–16.85)	0.007	5.65 (1.61–19.85)	.007
		Yes	2 (0.4)	3.35 (0.80–14.09)	0.098	3.58 (.55–23.36)	.182
	Alcohol dependence	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	—	—	—	—	—
	Drug dependence	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	0	—	—	—	—
	Posttraumatic stress disorder	No	33 (0.1)	Baseline			
		At risk	0	—	—		
		Yes	1 (1.2)	10.14 (1.37–75.03)	0.023	4.27 (.24–75.29)	.321
Severe Clinical Syndrome scales	Schizophrenic Spectrum	No	33 (0.1)	Baseline			
		At risk	1 (0.5)	3.88 (0.53–28.46)	0.18	1.47 (.13–16.60)	.756
		Yes	0	—	—	—	—
	Major Depression	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	0	—	—	—	—
	Delusional Disorder	No	34 (0.1)	Baseline			
		At risk	0	—	—	—	—
		Yes	0	—	—	—	—

relationship between parental psychiatric disorders and risk of autism is twofold. First, like in previous studies, this supports the idea that autism can have a genetic basis which is common with other psychiatric disorders to some extent; second, it indicates that we should consider the presence of psychiatric disorders among autistic families in interventional programs.

In summary, based on the results of the present study, it may be stated that the estimated prevalence of autism among Iranian children and adolescents is 0.1% (10 per 10 000); however, it seems that this prevalence represents cases who have more severe symptoms of autism.

Comorbid psychiatric disorders are common among autistic cases. Intellectual Disability, epilepsy, enuresis and ADHD are the most prevalent comorbid conditions in people with autism. These high rates of comorbid conditions should be considered in interventional programs.

Our findings also show that there is a relationship between some maternal psychiatric disorders and risk of autism, which is assumed to reveal a shared genetic basis between autism and other psychiatric disorders.

Limitations

The most notable limitation of the present study is that based on the data gathering procedure and diagnostic tool, the estimated prevalence could not reflect the number of all suspected ASD cases among Iranian children and adolescents; rather, it only reveals the prevalence of severe cases of autism.

As seen in Table 2, the presence of huge confidence limits and wide confidence intervals suggests sparse-data bias and imprecision.[29] This should be noted as an important limitation of this study that can influence our findings.

Regarding parental psychiatric disorders, we only had the mothers' data and thus, we could not depict a full picture of psychiatric disorders among parents of Iranian children with autism.

Authors' Contribution

MRM, NA, AKh, HZ, SAM, KK and MR prepared study proposal. All authors are involved in the data gathering process. HZ generated study hypotheses and drafted the manuscript. ZH analyzed data. All authors read and approved the final manuscript.

Conflict of Interest Disclosures

None declared.

Ethical Statement
The Ethics Committee Board of the National Institute for Medical Research Development (NIMAD) has approved this study (the ethics code: IR.NIMAD.REC.1395.001).

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