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Clinical Characteristics and Associated Socio-Demographic Factors of Autistic Spectrum Disorder in Erbil City: A Cross-Sectional Study

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Abstract: The increasing prevalence of Autism Spectrum Disorder (ASD) is a significant health concern influenced by both genetic and environmental factors. However, limited data exist on the socio-demographic and clinical characteristics associated with ASD in our region. This cross-sectional study assessed 200 children (155 boys and 45 girls) diagnosed with ASD at Hawler Psychiatric Hospital in Erbil city between January and December 2023. The Childhood Autism Rating Scale-Second Edition (CARS-2) was used for diagnosis and severity assessment. The mean age of participants was 4.6 ± 1.8 years, with males representing 77.5% of the sample. Cesarean section was the most common mode of delivery. The average parental ages were 34.8 years for mothers and 38.5 years for fathers. The first signs of autism were noticed at a mean age of 25.7 ± 9.7 months, with the first medical consultation at 34.6 ± 15.4 months and diagnosis at 42.4 ± 15.5 months. Delayed speech was the most common reason for seeking medical help. Statistically significant associations were found between severe autism symptoms and several factors, including older child age, younger age at first assessment, delayed speech, parental consanguinity, paternal age over 40, lower paternal education, and lower socioeconomic status. These findings emphasize the critical role of early detection and the influence of both socio-demographic and clinical factors on ASD symptom severity, highlighting the need for targeted early intervention strategies to improve outcomes in affected children.

Keywords: Autistic Spectrum Disorders; socio-demographic; clinical characteristics

1. Introduction

The diagnostic rate for Autism Spectrum Disorders (ASD) has increased over the last two decades, and currently 1 in 54 children is diagnosed with autism spectrum disorder in the United States [1].

Prevalence rates vary considerably worldwide, however, in all countries in which multiple studies have been conducted over time there is a pattern of increasing prevalence. Clearly, some of the increase is attributable to better detection, increased awareness, and use of broader diagnostic criteria, although these factors do not appear to fully explain the dramatic rise in ASD. ASD affects individuals of all socioeconomic levels, races, and ethnicities, with a 4:1 male-to-female ratio [2].

Many genetic and environmental factors have been investigated in the etiopathogenesis of ASD. Studies suggest that the interaction of multifactorial factors involving genetics, environment, and gene-environment interaction plays a role in the etiology of ASD [3,4]. Research has identified genetic variants on multiple chromosomes, including chromosomes 2, 3, 4, 6, 7, 10, 15, 17, and 22, with increased risk associated with consanguinity [5,6]. Moreover, higher incidence rates among siblings of individuals with ASD underscore the importance of early detection and developmental monitoring in at-risk populations [7]. Environmental factors, including advanced parental age and perinatal complications, have also been implicated [8,9].

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Sociodemographic characteristics such as male gender, nuclear family structure, and high parental education have been associated with an increased likelihood of ASD diagnosis [10].

According to both criteria (DSM-5 and ICD-11), the symptoms of ASD must be present before the age of three. The early detection of ASD allows intervention to be initiated even before a formal diagnosis is made, at a critical time in neurodevelopment, which consequently leads to better outcomes and prognosis [11–14].

To the best of our knowledge, there are no data about the characteristics of children and adolescents with autism attending outpatient clinics in the Kurdistan region of Iraq. This study aimed to shed light upon children with autism attending the child and adolescent psychiatric outpatient clinic at Erbil Psychiatric Hospital through documenting their condition and studying the association of autism with some of the common sociodemographic and clinical factors.

2. Participants and Methods

2.1. Study Design, Setting, and Participants

This cross-sectional study was conducted from January 1, 2023, to December 31, 2023. Recruitment of participants and data collection occurred during this period at the Child and Adolescent Psychiatric Outpatient Clinic of Hawler Psychiatric Hospital, a primary governmental psychiatric facility in Erbil with a dedicated child and adolescent psychiatric unit. The hospital provides diagnostic, treatment, and routine follow-up services to patients from the city and its surrounding areas. The study included children with autism attending the clinic, with a sample size calculated to require 150 cases; however, 200 cases were included to ensure robustness and account for potential dropouts or incomplete data. Participants were recruited and data were collected through routine clinic visits where caregivers of eligible children were approached. Following informed verbal consent, data were gathered using a structured questionnaire administered during these visits.

2.2. Inclusion and Exclusion Criteria

Initially, a total of 223 cases were reviewed for this study. After applying the inclusion and exclusion criteria, the final sample consisted of 200 children below 12 years of age. This included children who were either receiving their initial diagnosis from a senior psychiatrist or had been previously diagnosed with Autism Spectrum Disorder (ASD) according to The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria.

Children with unclear ASD diagnoses requiring further confirmation, as well as those aged 12 years or older, were excluded from the study.

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), published by the American Psychiatric Association, provides standardized criteria for the diagnosis of mental disorders, including ASD.

2.3. Data Collection

The questionnaire consisted of five main parts: socio-demographic information, perinatal period details, clinical characteristics, ASD severity, and socioeconomic state. A pilot study was conducted on 15 patients to validate the questionnaire; these results were excluded from the final analysis.

1. Socio-demographic Information:
    a. Age, sex, and place of residence (urban or rural).
    b. Number of children in the family.
    c. Caretaker details, specifying whether the mother was the sole caretaker during infancy or if there was another relative involved.
2. Perinatal Period:
    a. Mode of delivery; vaginal or cesarean section.

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b. Maturity at birth; Birth before 37 weeks regarded as premature, 38-42 weeks regarded as full term (on date) and after 42 weeks regarded as post term [15].
c. Neonatal admission; any newborn requiring admission to an incubator for more than two hours after delivery was considered a neonatal admission.

3. Clinical Characteristics:
   a. Age of the child when the first signs of abnormality were observed.
   b. Age when parents consulted a physician regarding the observed abnormality.
   c. Age at the time of initial ASD diagnosis.
   d. Age of parents.
   e. Age of parents at the time of the child's birth.
   f. Reason for consultation; the main concern of the family that made them seek psychiatrist such as (delay speech, poor response to name, hyperactivity, etc.).
   g. Consanguinity between parents.
   h. Family history of ASD.
   i. Family history of psychiatric disorders.
   j. Whether the child received any kind of training such as speech or behavioral therapy.
   k. Severity of ASD Symptoms: Assessment using the Childhood Autism Rating Scale (CARS) Second Edition, a widely used scale with good psychometric properties, focusing on core ASD symptoms. It consists of 15 scaling questions to evaluate the child's ASD severity. First, the scores for the single items are summed together for a total score. Then, the child is classified as having minimal to no symptoms of autism (below 30), mild to moderate autism (30–36.5), or severe autism (above 36.5) [16].
4. Socioeconomic State

   A locally-designed scale developed by Omer and Al-Hadithi in 2017 was used to assess the socioeconomic status of the participant families [17]. This scale includes factors such as the age, education level, and occupation of the parents, ownership of a house and a car, and the status of the head of the family (deceased or alive). Based on these factors, families were classified into low socioeconomic status (4.5 and below), middle socioeconomic status (4.6-9.5), or high socioeconomic status (9.6-14.0).

To ensure efficiency in data collection, each caregiver was interviewed for approximately 30 minutes, allowing sufficient time to complete the questionnaire while minimizing participant burden.

2.4. Statistical Analysis

Data were entered into IBM-SPSS V27 for statistical analysis. Descriptive statistics were presented using tables and graphs, while inferential statistics utilized the Chi-square test to assess associations between variables. Descriptive measurements were represented as percentages, frequency distribution, and mean. P values ≤ 0.05 were considered statistically significant.

2.5. Ethical Consideration

The study was approved by the scientific committee of the Arabic Board of Psychiatry and the research ethics committee of the College of Medicine, Hawler Medical University. Participants received a detailed explanation of the study aims, including the purpose, procedures, and potential risks and benefits. Informed verbal consent was obtained from parents, with the consent process documented through notes taken by the researcher and witnessed by a co-researcher. Only those who provided consent proceeded with the research.

The ethics committee waived the requirement for written informed consent in accordance with Paragraph 32 of the Declaration of Helsinki (2013), which allows for exceptions to standard consent procedures when obtaining written informed consent is impractical or unnecessary, provided the research is approved by an ethics committee [18]. Considering the study participants were children with autism, informed verbal consent was deemed appropriate and ethically justified.

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Confidentiality was maintained throughout the study. All personal information was anonymized and securely stored to ensure that participant identities were protected. Data were handled in compliance with relevant privacy regulations to ensure that confidentiality was upheld.

2. Results

This study included two hundred children with autism spectrum disorders (ASD) presented with a mean age and standard deviation (SD) of 4.6±1.8 years and a range of (1.8-11 years); 16% of the children with ASD were in the age group of less than 3 years, 45% of them were in the age group of 3-5 years, and 39% of the children were in age of more than 5 years. Male children with ASD were more than females (77.5% vs. 22.5%). About one-third of the children with ASD were living in rural areas (Table 1).

Table 1. General characteristics of children with ASD.

Variable	No.	%
Age		
<3 years	32	16.0
3-5 years	90	45.0
>5 years	78	39.0
Gender		
Male	155	77.5
Female	45	22.5
Residence		
Urban	142	71.0
Rural	58	29.0
Total	**200**	**100.0**

Prematurity represented 15.5% of children with ASD, while postdate deliveries were present in 6% of them. Cesarean section was the prevalent delivery mode for children with ASD (57.5%). The mothers were the primary caretakers for all the studied children with ASD. Only 23% of the children were only children of the family, while 77% had siblings. The mean age of mothers of children with ASD was 34.8±6.7 years; among them, 22.5% were aged 40 years or older. The mean maternal age at the time of birth was 30.4±6.3 years; 2.5% of mothers were less than 20 years old, 89.5% were between 20-39 years old, and 8% were 40 years or older. Meanwhile, the mean age of fathers of children with ASD was 38.5±7.5 years, with 40% of them being aged 40 years or older. The mean paternal age at the time of birth was 34.1±7.3 years; 0.5% of fathers were less than 20 years old, 79% were between 20-39 years old, and 20.5% were 40 years or older. A high educational level (college/institute) was present in 49% of the fathers and 37% of the mothers of children with ASD. The majority of fathers (64%) worked in private or non-governmental jobs, while the most common occupation for mothers was housewife (75.5%); 24.5% of mothers were employed outside the home. The Socio-Economic State Index class of families of children with ASD was low in 31.5%, medium in 46.5%, and high in 22% (Table 2).

 doi:10.20944/preprints202505.1105.v1

Table 2. Socio-demographic and perinatal characteristics of children with ASD.

Variable	No.	%
Maturity at birth		
Premature	31	15.5
On date	157	78.5
Postdate	12	6.0
Type of delivery		
Normal delivery	85	42.5
Cesarean section	115	57.5
Caretaker		
Mother	200	100.0
Number of children in family		
1 (child was alone)	46	23.0
>1 (child had siblings)	154	77.0
Mother's age		
20-39 years	155	77.5
≥40 years	45	22.5
Mother's age at birth		
<20 years	5	2.5
20-39 years	179	89.5
≥40 years	16	8.0
Father's age		
20-39 years	120	60.0
≥40 years	80	40.0
Father's age at birth		
<20 years	1	0.5
20-39 years	158	79.0
≥40 years	41	20.5
Father's education		
Illiterate	20	10.0
Primary level	42	21.0
Secondary level	40	20.0
College/institute	98	49.0
Mother's education		
Illiterate	30	15.0
Primary level	58	29.0
Secondary level	38	19.0
College/institute	74	37.0

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Father's occupation		
Governmental employee	72	36.0
Non-governmental employee	128	64.0
Mother's occupation		
Housewife	151	75.5
Has job	49	24.5
Socioeconomic class		
Low	63	31.5
Medium	93	46.5
High	44	22.0
Total	**200**	**100.0**

The mean age at which parents first observed signs of ASD in their children was around 25.7 months (± 9.7 months). Signs were observed at less than 1 year in 4.0% of the cases, at 1 to 2 years in 24.0%, at 2 to 3 years in 50.0%, at 3 to 4 years in 16.5%, and at 4 years and above in 5.5%. The mean age at first examination was about 34.6 months (± 15.4 months). The peak age for first examination was 2 to 3 years (36.5%), followed by 3 to 4 years (28.0%), 4 years and above (21.5%), 1 to 2 years (12.5%), and less than 1 year (1.5%). The mean age at diagnosis was about 42.4 months (± 15.5 months), with diagnosis ages distributed as follows: less than 1 year (0.0%), 1 to 2 years (3.0%), 2 to 3 years (27.0%), 3 to 4 years (29.5%), and 4 years and above (40.5%). The most common reason for consultation was delayed speech (67.5%), followed by no response to his or her name (15%), behavioral problems (4.5%), hyperactivity (4%), tantrums (3%), and other reasons. Consanguinity of parents was reported in 31% of children with ASD, with first-degree consanguinity (e.g., marriage between cousins) being the reported level. Consanguinity was explored by asking parents if they were related to their partner. A positive family history of autism was found in 21% of the children, and a family history of psychiatric disorders was positive in 18% of them. Behavioral and speech therapy were received by only 23.5% of children with ASD. The severity of ASD symptoms according to the CARS-2 score was minimal to no symptoms (13%), mild to moderate symptoms (63%), and severe symptoms (24%) (Table 3).

Table 3. ASD clinical characteristics.

Variable	No.	%
Age at first sign of abnormality (mean±SD = 25.7±9.7 months)		
<1 year	8	4.0
1-2 year	48	24.0
2-3 years	100	50.0
3-4 years	33	16.5
4 years and above	11	5.5
Age at first examination (mean±SD = 34.6±15.4 months)		
<1 year	3	1.5
1-2 year	25	12.5
2-3 years	73	36.5
3-4 years	56	28.0

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4 years and above	43	21.5
Age at first diagnosis (mean±SD = 42.4±15.5 months)		
<1 year	0	0.0
1-2 year	6	3.0
2-3 years	54	27.0
3-4 years	59	29.5
4 years and above	81	40.5
Reasons for consultation		
Delay speech	135	67.5
No response to name	30	15.0
Behavioral problems	9	4.5
Hyperactivity	8	4.0
Tantrum	6	3.0
Poor social interaction	5	2.5
Poor sleep	3	1.5
Delayed walking	2	1.0
Poor attention	2	1.0
Consanguinity		
Positive	62	31.0
Negative	138	69.0
Family history of autism		
Positive	42	21.0
Negative	158	79.0
Family history of psychiatric disorders		
Positive	36	18.0
Negative	164	82.0
Receive Behavioral and speech therapy		
Yes	47	23.5
No	153	76.5
Severity of ASD according to CARS-2 scores		
No symptoms- Minimum	26	13.0
Mild-Moderate	126	63.0
Severe	48	24.0
Total	**200**	**100.0**

There was a significant association between increased age of children and severe ASD symptoms. No significant differences were observed in ASD severity according to CARS-2 score regarding gender, residence, whether the child is alone or has siblings, mother's age at birth, father's age at birth, and mode of delivery. However, there was a significant association between children born on their due date and severe ASD symptoms (Table 4).

 doi:10.20944/preprints202505.1105.v1

Table 4. Distribution of general characteristics according to ASD severity.

Variable	CARS severity						P value
	No Symptoms		Mild-Moderate		Severe		
	No.	%	No.	%	No.	%	
Age							0.030
<3 years	3	11.5	29	23.0	0	-	
3-5 years	13	50.0	55	43.7	22	45.8	
>5 years	10	38.5	42	33.3	26	54.2	
Gender							0.800
Male	21	80.8	98	77.8	36	75.0	
Female	5	19.2	28	22.2	12	25.0	
Residence							0.190
Urban	17	65.4	95	75.4	30	62.5	
Rural	9	34.6	31	24.6	18	37.5	
Number of children							0.770
Child is alone	5	19.2	31	24.6	10	20.8	
Child has siblings	21	80.8	95	75.4	38	79.2	
Mother age at birth							0.994
<20 years	1	3.8	3	2.4	1	2.1	
20-39 years	23	42.3	113	46.8	43	41.7	
≥40 years	2	7.7	10	7.9	4	8.3	
Father age at birth							0.551
<20 years	0	0.0	0	0.0	1	2.1	
20-39 years	21	80.8	99	78.6	38	79.2	
≥40 years	5	19.2	27	21.4	9	18.8	
Mode of delivery							0.100
Normal delivery delivery	15	57.7	47	37.3	23	47.9	
Cesarean section	11	42.3	79	62.7	25	52.1	
Maturity at birth							0.005*
Premature	3	11.5	27	21.4	1	2.1	
On date	19	73.1	93	73.8	45	93.8	
Postdate	4	15.4	6	4.8	2	4.2	

*Fishers exact test.

No significant differences were observed in ASD severity regarding age at the first sign of abnormality and age at diagnosis. However, there was a significant association between younger age at the first examination and severe ASD symptoms. Additionally, a significant association was observed between delayed speech in children and severe ASD symptoms, as well as between positive consanguinity and severe ASD symptoms. No significant differences were found among children

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with ASD of different severities regarding family history of autism, family history of psychiatric disorder, or received training (Table 5).

Table 5. Distribution of ASD characteristics according to ASD severity.

Variable	CARS severity						P value
	No Symptoms		Mild-Moderate		Severe		
	No.	%	No.	%	No.	%	
Age at first sign of abnormality							0.091*
<1 year	1	3.8	3	2.4	4	8.3	
1-2 year	2	7.7	36	28.6	10	20.8	
2-3 years	13	50.0	62	49.2	25	52.1	
3-4 years	7	26.9	21	16.7	5	10.4	
4 years and above	3	11.5	4	3.2	4	8.3	
Age at first examination							0.031*
<1 year	0	0.0	0	0.0	3	6.3	
1-2 year	2	7.7	16	12.7	7	14.6	
2-3 years	6	23.1	48	38.1	19	39.6	
3-4 years	8	30.8	38	30.2	10	20.8	
4 years and above	10	38.5	24	19.0	9	18.8	
Age at first diagnosis							0.600*
1-2 year	1	3.8	5	4.0	0	0.0	
2-3 years	3	11.5	43	34.1	8	16.7	
3-4 years	8	30.8	34	27.0	17	35.4	
4 years and above	14	53.8	44	34.9	23	47.9	
Reasons for consultation							0.020*
Delay speech	19	73.1	87	69.0	29	60.4	
Poor sleep	0	0.0	3	2.4	0	0.0	
No response to name	2	7.7	21	16.7	7	14.6	
Hyperactivity	3	11.5	0	0.0	5	10.4	
Poor social interaction	1	3.8	4	3.2	0	0.0	
Behavioral problems	0	0.0	5	4.0	4	8.3	
Delay walking	0	0.0	0	0.0	2	4.2	
Tantrum	1	3.8	4	3.2	1	2.1	
Poor attention	0	0.0	2	1.6	0	0.0	
Consanguinity							0.010
Positive	7	26.9	32	25.4	23	47.9	
Negative	19	73.1	94	74.6	25	52.1	
Family history of autism							0.090
Positive	2	7.7	26	20.6	14	29.2	

 doi:10.20944/preprints202505.1105.v1

Negative	24	92.3	100	79.4	34	70.8	
Family history of psychiatric disorders							0.901
Positive	5	19.2	23	18.3	8	16.7	
Negative	21	80.8	103	81.7	40	83.3	
Receive training							0.141
Yes	4	15.4	27	21.4	16	33.3	
No	22	84.6	99	78.6	32	66.7	

*Fishers exact test.

There is a significant association between the severity of ASD symptoms and both fathers' age and educational level. However, no significant differences in ASD symptoms were found based on the father's occupation, the mother's age, the mother's education level, or whether the mother is working or a housewife. (Table 6).

Table 6. Distribution of parental characteristics according to ASD severity.

	CARS severity						
Variable	**No Symptoms**		**Mild-Moderate**		**Severe**		**P value**
	No.	**%**	**No.**	**%**	**No.**	**%**	
Age of father							0.030*
20-39 years	14	53.8	84	66.7	22	45.8	
≥40 years	12	46.2	42	33.3	26	54.2	
Age of mother							0.101*
20-39 years	21	80.8	102	81.0	32	66.7	
≥40 years	5	19.2	24	19.0	16	33.3	
Father's education							0.040
Illiterate	3	11.5	8	6.3	9	18.8	
Primary level	4	15.4	25	19.8	13	27.1	
Secondary level	8	30.8	22	17.5	10	20.8	
College/institute	11	42.3	71	56.3	16	33.3	
Mother's education							0.161
Illiterate	5	19.2	14	11.1	11	22.9	
Primary level	8	30.8	36	28.6	14	29.2	
Secondary level	1	3.8	27	21.4	10	20.8	
College/institute	12	46.2	49	38.9	13	27.1	
Father's occupation							0.060
Governmental employee	4	15.4	50	39.7	18	37.5	
Non-governmental employee	22	84.6	76	60.3	30	62.5	
Mother's occupation							0.900

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Housewife	20	76.9	95	75.4	36	75.0
Working	6	23.1	31	24.6	12	25.0

*Fishers exact test.

There was a significant association between low SESI class and ASD symptoms (Table 7).

Table 7. Association between SESI class and severity of ASD.

Variable	CARS class						P value
	No Symptoms		Mild-Moderate		Severe		
	No.	%	No.	%	No.	%	
SESI class							0.006
Low	6	23.1	34	27.0	23	47.9	
Medium	18	69.2	61	48.4	14	29.2	
High	2	7.7	31	24.6	11	22.9	

4. Discussion

This is the first study done in Iraq examining the socio-demographic and clinical characteristics of ASD in the region.

In this study, the mean age of children with autism spectrum disorders (ASD) was 4.6±1.8 years, which aligns with studies conducted in KSA and Malaysia, where mean ages of 4.6±2.2 years and 5.5 ±2.6 years were reported, respectively [19,20]. This age was lower than that found in a study in Bangladesh, which reported a mean age of 6.66±2.97 [21], However, another study in Malaysia demonstrated significantly higher mean age, reporting a mean age of 9.35±1.7 [22]. This difference may be attributed to improved awareness and education among parents regarding early consultation and diagnosis of ASD, as well as the fact that the samples were drawn from hospital settings. Overall, these findings suggest that most children with ASD are diagnosed and begin outpatient consultations during preschool and early school years. This period coincides with children attending kindergarten and facing increasing social and academic demands, presenting challenges for children with autism in meeting these expectations [23].

In our study, a significant association was found between older age of children and more severe ASD symptoms. Researchers noted that the severity of autism symptoms can change significantly between ages 3 and 11, with a higher percentage of children showing increased severity between ages 6 and 11 compared to other age ranges [24]. Another study observed that decreases in symptom severity were more common during early childhood, while increases in severity were more prominent during middle childhood [25].

Regarding the gender distribution among children with autism in our study, 77.5% were male and 22.5% were female, aligning with the findings from other studies [26–29]. We did not observe any significant differences between gender and the severity of ASD symptoms in our study, consistent with findings from a study conducted in the USA [30].

A high percentage of cases were from urban areas, primarily within Erbil, and a higher percentage exhibited moderate to severe autism. This finding is consistent with previous studies [31,32]. This disparity is expected due to easier access to specialized centers and hospitals for consultation and diagnosis in urban areas, as well as differences in parental education levels between urban and rural settings. Future studies are needed to better understand the rates and severity of autism in both rural and urban areas.

Regarding the number of siblings, 77% of children with autism had siblings, while 23% did not. This proportion was lower than in a previous study where 46.9% of children with autism had no

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siblings [32]. This variation may be attributed to cultural and societal differences, particularly in regions where larger family sizes are common, in addition to differences in study sample sizes.

Regarding the mode of delivery, 57.5% of children with autism were born via C-section and 42.5% via vaginal delivery, with no significant association observed with the severity of autism. Studies on the relationship between C-sections and autism have yielded mixed results, with some indicating a slightly increased risk compared to vaginal delivery, while others find no significant association [33]. A meta-analysis mentioned that C-section delivery may be a risk factor for ASD, particularly for births occurring between gestational weeks 36 and 42, compared to vaginal delivery [34]. Another study across five countries found higher odds of ASD among children born via C-section due to potential factors such as oxytocin dysregulation and anesthesia-related neurotoxicity [35].

Most of the children with autism in our study exhibited mild to moderate symptoms based on the CARS-2 score, contrasting with a study done by Tan D et al., in which the majority had severe ASD symptoms [36]. In our study, 24% had severe ASD symptoms, consistent with findings from the Centers for Disease Control and Prevention (CDC) reporting that over one in four children with autism exhibit "profound autism" [37]. The differences in autism severity across studies may be influenced by cultural variations in diagnosis, access to healthcare and early intervention, screening tools used, genetic and environmental factors, and sample selection methods. Future studies are needed to better understand these factors and how they influence the identification and severity of autism across different populations.

Our study revealed that the mean age of fathers was 38.5±7.5 years, with 40% of them aged forty years or older. We found a statistically significant association between advanced paternal age and severity of ASD symptoms, whereas maternal age showed no such association. This finding aligns with studies from multiple geographic regions indicating a higher risk of ASD among children born to fathers older than 45 years, independent of maternal age [38,39].

The majority of families in our study first noticed signs of abnormality in their children by the age of two years. This age was later than reported in studies from Nigeria and India [40,41], reflecting cultural differences and varying parental awareness of early signs of autism across different regions and study populations.

The mean age at first examination in our study was approximately three years ± one year, similar to findings from a previous study in India [40], but dissimilar to a study in Nigeria where the mean age at diagnosis was significantly higher at 8.13±3.98 years [41]. This discrepancy is likely due to easier access to specialists and medical services for diagnosis in our study setting. Although ASD can be diagnosed as early as 18 months of age [42], the latest review indicated that, globally, the mean age at ASD diagnosis ranges between 38 and 120 months [43].

We found a significant association between the age at first examination and severity of autism in our study sample. This finding is supported by research conducted in France, which also found a significant association between age at diagnosis and severity of autism [44]. It suggests that parents are more likely to seek early consultation and intervention for severe symptoms, whereas mild to moderate symptoms may not be recognized as requiring immediate intervention.

The mean age at diagnosis in our sample was around three and a half years, which is later than Preeti et al. with the first consultation age at 32.5 months [45]. A systematic review and meta-analysis covering studies from 2012 to 2019 reported a mean age at diagnosis of approximately five years across 35 countries [46]. Thus, most children who are ultimately diagnosed with ASD are not diagnosed until after the age of 4, despite the fact that parents often express concerns a year or two before this age [47]. The delay between the age of first examination and diagnosis may be attributed to factors such as parental denial, consultation with multiple specialties for diagnosis, or the challenge of diagnosing ASD before three years of age when symptoms may be less clear.

The primary reason for family consultation in our study was delayed speech, significantly associated with more severe ASD symptoms, consistent with findings from a study done by Herlihy

 doi:10.20944/preprints202505.1105.v1

L et.al [48]. This underscores the tendency of parents to prioritize speech delays over recognizing earlier signs such as social and non-verbal communication issues.

In our study, 31% of cases had parental consanguinity, and consanguinity was significantly associated with the severity of ASD. These results are consistent with findings from Saudi Arabia and Qatar [49,50]. This correlation suggests that parental consanguinity may influence the severity of ASD symptoms, possibly due to the prevalence and cultural acceptance of consanguineous marriages in the region. A study conducted in Erbil city in 2018 found that 41% of children and adolescents attending a Child and Adolescent Psychiatric Outpatient Clinic had parents who were consanguineous, further supporting this notion [51]. This is likely because consanguineous marriage is a common and traditionally preferred custom in the area.

Regarding family history of ASD, 21% of cases had a positive family history. A population-based cohort study in Sweden estimated the heritability of ASD at approximately 50%, though we did not find a statistically significant association between family history and severity of symptoms in our study [52].

Early intervention is crucial in the treatment of children with autism [53]. However, only 23.5% of children in our study received speech or behavioral training, contrasting sharply with a study in USA where nearly 70% of children received behavioral or medication treatments [54]. This low rate of intervention in our sample may be attributed to factors such as inadequate parental education about the importance of early speech and behavioral therapies, economic constraints, insufficient public training and rehabilitation centers for autism in our city, and a shortage of specialized experts in the field.

Forty-nine percent of fathers had a bachelor's degree, and there was a significant association between higher paternal education levels and more severe ASD symptoms. A previous study concluded that higher levels of parental education, specifically obtaining a university degree (bachelor's degree or higher), lead to earlier detection of ASD, underscoring the instrumental role of parental education in catalyzing early interventions and facilitating appropriate support systems for children with ASD [55]. In contrast, a Swedish population-based study concluded that no significant relationships with parental education were observed [56].

Regarding maternal occupation, 75.5% of mothers of children with autism in our study were homemakers, which is higher than in previous studies [57]. This may be attributed to cultural factors, where women are less educated and do not work outside the home.

Most children with autism in our study belonged to the middle socioeconomic class. A systematic review found that higher parental socioeconomic status (SES) was positively associated with the prevalence of ASD [58].

We found a statistically significant association between lower socioeconomic class and more severe autism symptoms, consistent with research suggesting that ASD prevalence is higher in areas with greater levels of deprivation [59]. This finding underscores the impact of socioeconomic status on early consultation and intervention, which are critical factors in the management of ASD.

This study has several limitations that should be considered. Firstly, our findings are limited to outpatient children with Autism, which may affect the generalizability of the results to other populations or settings. The absence of a control group further limits our ability to make comparative assessments. Moreover, since the majority of participants resided in Erbil city, the findings may not be generalizable to a national sample. Additionally, potential bias may arise from caregiver data, as responses can be influenced by subjective perceptions or misunderstandings regarding the child's condition and behavior. This could affect the accuracy of the information provided and subsequently impact the study's findings.

5. Conclusions

This study provides valuable insights into the characteristics of children with Autism Spectrum Disorder (ASD) attending the Child and Adolescent Psychiatric Outpatient Clinic in Erbil, Kurdistan. The findings indicate a predominance of males among the diagnosed children, with delayed speech

 doi:10.20944/preprints202505.1105.v1

being the most common reason for consultation. Notably, the age at which parents first observed signs of ASD and the age of diagnosis varied, highlighting the need for increased awareness and early detection strategies. The study also identified significant associations between the severity of ASD symptoms and factors such as the age of the child, the presence of delayed speech, and parental consanguinity. Importantly, the socio-economic status of families showed a diverse distribution, suggesting that ASD affects children across various socio-economic backgrounds in the region.

These findings underscore the necessity for enhanced diagnostic resources and support services tailored to the needs of families in Kurdistan, aiming to improve early intervention and management strategies for children with ASD.

6. Recommendations

To improve outcomes for children with Autism Spectrum Disorder (ASD), several recommendations are suggested. Firstly, raising awareness about the early features of ASD can encourage families to seek specialist consultations and initiate treatment at an earlier stage. Providing psycho-education to families about treatment options and the significance of early intervention can positively influence both the prognosis and long-term outcomes of the disorder. Additionally, increasing the availability of public rehabilitation centers for children with ASD is crucial, as many families face financial barriers to accessing private facilities. Finally, future research with larger sample sizes is recommended to identify additional risk factors and further understand the complexities of ASD.

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Informed Consent Statement: Informed verbal consent was obtained from the parents of all participants involved in the study. The requirement for written informed consent was waived by the ethics committee due to the minimal risk nature of the study and cultural considerations, in accordance with Paragraph 32 of the Declaration of Helsinki.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

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