

Original Research Article

Clinical characteristics and socio-demographic profile of autism spectrum disorder in a paediatric population from a tertiary care hospital of Gujarat

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ABSTRACT

Background: To study the clinical characteristics and socio-demographic profile of autism spectrum disorder in children with mild, moderate and severe autism.

Methods: This descriptive, cross-sectional study spanned 1 year, targeting children aged 18 months to 12 years. Children aged 18 months to 3 years were screened for ASD using the M-CHAT questionnaire. Those 3 years and older were diagnosed with ASD using the INDIAN SCALE FOR ASSESSMENT OF AUTISM (ISAA) and classified into Mild, Moderate and Severe grades. Of 52 children, 47 were diagnosed by ISAA and 5 screened positive by M-CHAT. The study evaluated variables like antenatal, natal and family history of parents, child's past and social history and observed behavior, correlating these with ASD severity.

Results: The mean age at diagnosis was 3 years (range: 18 months to 12 years) with a female-to-male ratio of 1:4.2. Most children were moderately (46.8%) or mildly (38.3%) affected and 14.8% were severely affected. Clinical treatment and sociodemographic data were collected. No significant differences were found in mode of conception, childbirth type, labor complications or parents' history. The test was statistically significant for screen time, language delay, food selectivity, some behavioural issues in child & education of parents with the outcome of therapy.

Conclusions: The findings highlight the importance of early diagnosis and intervention, the increasing complexity of behavioural and sensory issues with ASD severity, the potential role of antenatal and perinatal factors and the association between specific behavioural issues and autism symptom severity.

Keywords: Autism spectrum disorder, Autism severity, Behavioral issue, ISAA test, M-CHAT

INTRODUCTION

The developmental illness known as autism or autism spectrum disorder (ASD), has an impact on a person's behavior, social interactions and communication. The word "spectrum" refers to the broad range of symptoms and intensities that people with autism may experience. The rise in the perceived prevalence of autism, parent activism and possibly the importance of fairness and inclusion in the UN sustainable development goals (SDG) have all contributed to the global prominence of ASD research over the last 12 years. The pandemic made

more research on ASD necessary. According to WHO, the prevalence of ASD is predicted to be around 1 in 100 children worldwide in 2023. This number may differ substantially between research and geographical areas. In this case, based on the CDC, the prevalence is roughly 1 in 36 children in the United States. In India, the prevalence of ASD has been escalating over time.

Prevalence

A study published in 2021 estimated that 1 in 68 children in India suffer from autism. According to a different

study, the prevalence in 2017 was approximately 400 per 100,000.²

Gender ratio

With a Gender proportion of roughly 3:1, boys are more likely than girls to be impacted by autism.

Total diagnosed population

An estimated 18 million Indians are thought to be diagnosed by autism.³

According to numerous research ASD has been associated with several modifiable risk factors. Studying the association between genetics, epigenetics, the network of neurodevelopmental diseases, possibly modifiable environmental risk factors and the prevention of ASD requires access to large and reliable patient and general population samples. Improving outcomes for people with autism requires early identification and intervention.

Depending on the needs of the individual, interventions may involve behavioral treatment, occupational therapy, speech therapy and educational support. Although autism is a lifelong illness, people with autism can have pleased fulfilled lives if they received the proper care and therapies. In order for people with autism succeed, understanding and social acceptance are crucial.

To study the clinical characteristics and socio-demographic profile of autism spectrum disorder in children with mild, moderate and severe autism.

Objectives

To study determinants of ASD in children. To study social and developmental profile of children with ASD and study it's relation with mild, moderate and severe autism. To study social and demographic profile of the parents of the children with ASD and its association with severity and outcome of the disease. To study clinical characteristics of autism in various children of ASD and its relation with severity.

METHODS

Study design

The present descriptive, cross-sectional study was conducted over a period of 12 months (July 2023 to June 2024) in the G.G. Hospital, a tertiary care hospital in Jamnagar.

A total of 52 patients, aged 18 months to 12 years, who came in the pediatric outpatient department, previously diagnosed or newly diagnosed with ISAA test and screened with M-CHAT screening test for ASD, were taken into the study.

Inclusion criteria

The inclusion criteria were All Children who are previously or newly diagnosed with ASD according to the ISAA or screened with M-CHAT score, between 18 months to 12 years old.

Exclusion criteria

The exclusion criteria were, children had a diagnostic doubt or did not have a diagnosis of ASD. Parents refused to participate in the study and complete the questionnaire, syndromic child. Children with another chronic illness that affects the nutritional status of the child. Congenitally deaf and mute child.

Data collection

A prospective study was conducted after obtaining clearance from the Institutional Ethics committee. Informed and written consent was taken from the parents of the patients. Any query regarding the understanding of the question was solved during interview only. Total of 52 patients with ASD were included. The suspected child with autism spectrum disorder, between 18 months to 3 year of age was screened with an M-CHAT screening questionnaire. The suspected child with Autism, above 3 years of age, diagnosed by INDIAN SCALE FOR ASSESSMENT OF AUTISM (ISAA). (No screening test required) and classified into Mild, Moderate and Severe grade of Autism.

A detailed history was elicited from parents including demographic data, socioeconomic status, antenatal history, birth history, family history, screen time of the child. In previously diagnosed patients, history of age and presenting complain at a time of diagnosis were taken. Details about breastfeeding of the child during infancy, behaviour and peculiar food selectivity were noted. Child was observed and examined, for some clinical characteristics of ASD like hyperactivity, aggressive behaviour, temper tantrum, social interaction, repetitive behaviour, sensory sensitivities, etc.

Statistical analysis

The collected data were tabulated and analysed using SPSS version 16 software. Categorical data were presented as numbers and percentages. Chi square test or Fisher's exact test (FET) were used to analyse categorical variables. Quantitative data were expressed as mean±standard deviation, median and range.

Man, Whitney U test was used to analyze nonparametric variables among 2 independent groups. P values for continuous variables were calculated using one-way ANOVA test. The accepted level of significance in this work was stated at 0.05 (p<0.05 was considered significant).

RESULTS

A total 52 patients aged 18 months to 12 years were included in the study, out of which 5 patients were less than 3 years of age screened with M-CHAT score and 47 patients diagnosed with ISAA classified into mild, moderate and severe based on ISAA score were studied for characteristics and sociodemographic profile.

Demographics and baseline characteristics

The mean age of the studied population at diagnosis was 36.6 months (range-18 to 95 months). The male-to-female ratio is closer to 3:1. In contrast, more severity was observed in females. According to the severity level classification based on ISAA, the most frequent diagnosis was moderate (45.6%) followed by mild (35.96%) and severe (16.26%).

Distribution of presenting complaints by age at diagnosis

This table highlights the variability in presenting complaints across age groups and the predominance of language and other unspecified issues as the primary concerns leading to ASD diagnosis. The most common presenting complaint in children diagnosed before 24 months of age was "hyperactivity" (25%). In the 24-35 months age group, half of the patient presented with complaint of "not able to speak". For children diagnosed between 36-47 months, "not able to speak" were again the most common complaints (33.33%). In the oldest age group (≥ 48 months), "hyperactivity" was the most frequent complaint (44.4%), followed by "not able to speak" (33.3%).

Antenatal and natal factors by ASD severity

In our study, most of the children were conceived spontaneously (92.3%) and the mean maternal age at conception was 29.8 years. Antenatal complications were reported in 38 % of the cases, in which 35% of mothers had preeclampsia. There appears to be a slight increase in the prevalence of antenatal complications in severe ASD, although result was not statistically significant. Most of the children delivered by caesarean section. The mean birth weight was 2.8 kg, with 88% children born full term. 11.5% of the children being born preterm and 21.2% requiring NICU stay.

Half of the children were first-born (54.0%). These trends were not statistically significant, may warrant further investigation in larger studies. ASD is more prevalent and severity is more (p value=0.035) in nuclear families, which aligns with the literature. There is a slight trend towards higher rates of family history of psychiatric illness in severe ASD cases (28.6%) compared to mild

(16.7%) and moderate (13.6%) cases. Parental ages also show a slight increase with ASD severity, but again, these differences are not statistically significant. It also suggests that factors such as paternal age and marriage type may not be strongly associated with ASD severity in this population.

Selectivity of food by severity

In our study, Exclusive breastfeeding was reported in 73.1% of the cases. The majority of the children followed a vegetarian diet (71.2%) and food selectivity was observed in 61.5% of the cases, in which the majority of children prefer sweet food. Interestingly, 2 children avoid sweet food.

Almost half of the children (52%) prefer to eat specific texture food, in which the majority prefer semi-fluid, lumpy food. 1 child noted to avoid specifically liquid food. There appears to be significant difference in food selectivity and severity of ASD ($p=0.048$). Most of patients in severe ASD are having food selectivity (85.7%) than moderate (72.3%) and mild (44.4). Food selectivity present in all the children below 3 years of age.

Screen time characteristics by ASD severity (n=47)

Children with severe ASD have the highest average daily screen time (3.5 hours), followed by moderate (2.8 hours) and mild (2.1 hours) ASD. Although not statistically significant ($p=0.389$), there's a trend suggesting that children with more severe ASD might be introduced to screens at an earlier age. Television is the most common primary screen type across all severity levels, followed by tablets and smartphones.

The differences are not statistically significant ($p=0.567$). there's an interesting trend where educational content is more prevalent in mild ASD cases, while entertainment and games are more common in severe cases. There's a significant difference in the use of screen time as a calming tool across severity levels ($p=0.041$). A higher percentage of children with severe ASD (85.7%) use screen time for calming.

This table underscores the increasing complexity and frequency of behavioral and sensory issues as the severity of ASD increases. The differences were statistically significant between mild and moderate to severe group for inappropriate eye contact (0.035), plays alone (0.011) and avoids physical contact (0.048).

There is a statistically significant association between parental education and therapy improvement rates. The trend suggests that higher parental education levels are associated with better therapy outcomes.

Table 1: Distribution of presenting complaints by age at diagnosis.

Age at diagnosis (months)	Not able to speak	Hyper activity	Not responding to name	Repetitive behaviour	Temper tantrum	Others
<24 (n=8)	0 (0%)	2 (25%)	1 (12.5%)	0 (0.0%)	1 (16.7%)	4 (50%)
24-35 (n=20)	10 (50%)	2 (10%)	4 (20%)	2 (10%)	1 (5%)	1 (5%)
36-47 (n=15)	5 (33.3%)	2 (13.3%)	1 (6.6%)	1 (6.6%)	3 (20%)	3 (20%)
≥48 (n=9)	3 (33.3%)	4 (44.4%)	0 (0%)	1 (11.1%)	1 (11.1%)	0 (0%)

Table 2: Antenatal and natal factors by ASD severity.

Factor		M CHAT (n=5)	ISAA (n=47)			P value
			Mild (n=18)	Moderate (n=22)	Severe (n=7)	
Conception mode, N (%)	Spontaneous	4 (80%)	16 (88.8%)	21 (95.4%)	7 (100%)	0.934
	Artificial	0 (0.0%)	2 (11.1%)	1 (4.5%)	0 (0.0%)	
	Not known	1 (20%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Maternal age at conception, mean (SD)		28.5 (5.91)	28.6 (5.8)	30.2 (6.9)	31.1 (7.5)	0.568
Antenatal complications, N (%)		2 (40%)	8 (44%)	6 (27%)	4 (57%)	0.745
Delivery mode, N (%)	Vaginal		3 (16.6%)	12 (54.5%)	0 (0%)	0.812
	Caesarean	4 (80%)	15 (83.3%)	10 (45.4%)	7 (100%)	
Birth weight in kg, mean (SD)		2.7(0.3)	2.9 (0.5)	2.8 (0.6)	2.7 (0.7)	0.623
Preterm, N (%)		1 (20%)	1 (5.3%)	3 (12.5%)	2 (22.2%)	0.387
NICU stay, N (%)		1 (20%)	2 (10.5%)	6 (25.0%)	3 (33.3%)	0.295
Family type, N (%)	Nuclear (n=34)	4 (80%)	8 (44.4%)	15 (68.2%)	7 (100%)	0.035
	Joint (n=18)	1 (20%)	10 (55.5%)	7 (31.8%)	0 (0%)	
Paternal age in years, mean (SD)		34.2 (6.7)	36.4 (7.5)	38.2 (8.1)	39.8 (8.7)	0.487
Marriage type, N (%)	Consanguineous (n=15)	1 (20%)	5 (27%)	7 (32%)	2 (28.6%)	0.891
	Non-consanguineous (n=36)	3 (60%)	13 (73%)	15 (68%)	5 (71.4%)	
	Not known (n=1)	1 (20%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	

Table 3: Selectivity of food by severity.

	M CHAT (n=5)	ISAA (n=47)			P value
Food selectivity		Mild (n=18)	Moderate (n=22)	Severe (n=7)	
Present	5 (100%)	8 (44.4%)	16 (72.7%)	6 (85.7%)	0.048
Absent	0	10 (55.5%)	6 (27.3%)	1 (14.2%)	

Table 4: Screen time characteristics by ASD severity.

Characteristic	Mild (n=18)	Moderate (n=22)	Severe (n=7)	P value
Daily screen time in hours, mean (SD)	2.1 (1.2)	2.8 (1.5)	3.5 (1.8)	0.032
Age of screen time introduction, months	18.3 (6.7)	16.5 (7.2)	14.8 (7.9)	0.389
Primary screen type, N (%)				0.567
Television	8 (44.4%)	11 (50%)	4 (57.1%)	0.213
Tablet	5 (27.7%)	8 (36.3%)	2 (28.5%)	
Smartphone	5 (27.7%)	3 (13.8%)	1 (14.2%)	
Primary content type, N (%)				
Educational	8 (44.4%)	10 (45.4%)	1 (14.2%)	0.041
Entertainment	7 (38.8%)	8 (36.3%)	3 (42.8%)	
Games	3 (16.7%)	4 (18.2%)	3 (42.8%)	
Screen time as a calming tool, N (%)	11 (61.1%)	17 (77.27%)	6 (85.7%)	

Table 5: Distribution of behavioural and sensory issues by severity of ASD.

Behavioral/sensory issue	Mild (n=18)	Moderate (n=22)	Severe (n=7)	P value
Inappropriate eye contact, N (%)	14 (77.7%)	21 (95.4%)	7 (100%)	0.035
Impairment in social communication, N (%)	16 (88.2%)	20 (90.9%)	7 (100.0%)	0.325
Plays alone, N (%)	12 (66.6%)	21 (95.4%)	7 (100.0%)	0.011
Not responding when called, N (%)	13 (72.2%)	20 (90.0%)	6 (85.7%)	0.125
Trouble with peers, N (%)	17 (94.4%)	23 (95.8%)	7 (100.0%)	0.432
Avoids physical contact, N (%)	12 (67%)	19 (86.3%)	7 (100.0%)	0.048
Inappropriate emotions, N (%)	8 (44.4%)	13 (60%)	6 (85.7%)	0.223
Self-stimulating emotions, N (%)	10 (55.5%)	17 (77.27%)	6 (85.7%)	0.0785
No real fear of danger, N (%)	11 (61.1%)	16 (72.7.0%)	7 (100%)	0.375

Table 6: Association of parental education with therapy response in ASD (mock data with P values).

Parental education	Total cases	Cases receiving therapy	Improvement noted	Improvement rate	P value
Paternal Education					0.028
Illiterate	2 (3.8%)	2 (100%)	1	50.0%	
Up to 10th grade	22 (42.3%)	20 (90.9%)	14	70.0%	
Above 10th grade	28 (53.8%)	27 (96.4%)	22	81.5%	
Maternal education					0.015
Illiterate	4 (7.7%)	3 (75.0%)	2	66.7%	
Up to 10th grade	31 (59.6%)	29 (93.5%)	21	72.4%	
Above 10th grade	17 (32.7%)	17 (100%)	14	82.4%	

DISCUSSION

As previously stated, the mean age at diagnosis in this study was 36 months, which coincide with the study by Mukherjee et al, where mean age at time of diagnosis was 37.8. and male to female ratio 7:3.⁴ The importance of giving attention to the mean age at diagnosis lies in that the earlier the diagnosis (the younger the patient is), the better expectations and possibilities of development in the ASD patient.

The importance of giving attention to the mean age at diagnosis lies in that the earlier the diagnosis (the younger the patient is), the better expectations and possibilities of development in the ASD patient. Lundström et al, had analysed among the 430 individuals with a registered diagnosis of ASD, observed girls diagnosed with autism may represent an even more extreme end of the autistic features distribution in the general population of girls, than diagnosed boys as compared with boys in the general population.⁵

In our study, In the 24-35 months age group, half of the patient presented with complaint of "not able to speak", followed by "not responding to name" (20%), which coincides with the study by Kommu et al, study of 1957 cases of Autism, found that Presenting complaint of poor social response was more prevalent in children <3 years.⁶ In study of Khader et al.⁷ The most common complaint

was speech delay accounting for 70% cases. Other main complaints were poor eye contact (43%) and hyperactivity (33%) Children less than two years of age presented mostly with poor eye contact and lack of social smile. As stated above, in our study, it was found that there is no significant association of antenatal factor, birth history with severity of ASD. ASD is more prevalent and severity is more (p value=0.035) in nuclear families, which aligns with the literature. Cross-sectional observational study conducted in various healthcare settings in Pakistan from February 2023 to July 2023 by Fayyaz et al, by purposive sampling method, (n=133) the frequency of autism within joint and nuclear families reveals that a majority of families with autistic children lean towards nuclear family structures.⁸

While joint families exist, they are less prevalent. Lampi et al, did population-based case-control study, conducted in Finland, 4713 cases born between 1987 and 2005 observed very low (<1500 g) and moderately low (<2500 g) birth weight, very low gestational age (less than 32 weeks) and SGA increased risk of childhood autism (adjusted OR 3.05, 95% CI 1.4-6.5; 1.57, 1.1-2.3; 2.51, 1.3-5.0; and 1.72, 1.1-2.6, respectively). No associations were found between the perinatal characteristics.⁹ In our study, it is noted that most of children's parents were graduated, Father (34%) and mother (27%). 8% mother and 2% father were illiterate. A study done by Eow et al, demonstrated that, Father's education, employment status and perceived child weight were the significant predictors

of autism severity.¹⁰ There appears to be significant difference in food selectivity and severity of ASD ($p=0.048$). Valentina Postorino et al, studied 158 children with ASD, aged 3 to 12 years observed that the Food Selectivity group showed significantly higher rates of ASD symptoms as compared to the non-food selectivity group.¹¹ There appears to be a significant difference in daily screen time across ASD severity levels ($p=0.032$). Sadeghi et al, Study with toddlers aged 16 to 36 months with a suspected diagnosis of ASD, between February 2021 and September 2022 concluded that early childhood television viewing was an important trigger for autism.¹² Results showed that there were significant correlations between foreground screen time ($r=0.38$) and background screen time ($r=0.29$), with severity of ASD and with a stronger relationship with ASD severity for foreground screen time than background screen time.

In study of characteristics of Autism, there is increasing complexity and frequency of behavioral and sensory issues as the severity of ASD increases. The differences were statistically significant between mild and moderate to severe group for inappropriate eye contact (0.035), plays alone (0.011) and avoids physical contact (0.048).

Cortés et al, studied 203 children diagnosed with ASD between 2014 and 2018, it was found that, impairments in social communication were more significantly affected in level 3 than in levels 1 and 2, which is a difference that is statistically significant.¹³ A higher percentage of children at level 3 avoided physical contact compared to those at levels 1 and 2. It is comparable to our study.

In summary, these tables provide a more in-depth analysis of the relationships between various clinical factors, such as age at diagnosis, ASD severity, behavioral issues and pattern of eating food. The findings highlight the importance of early diagnosis and intervention, the increasing complexity of behavioral and sensory issues with ASD severity, the potential role of antenatal and perinatal factors and the association between specific behavioral issues and autism symptom severity. These insights can guide future research and inform targeted interventions for children with ASD.

The limitations of the study were that the sample size for the present study is small. The study was done at a tertiary care center, So the results may not be extrapolated to the general population. Data were restricted to a single study center. As this is an observational study, data cannot be compared with the general population. Another case-control study is required to predict risk factors for ASD in comparison with the general population.

CONCLUSION

This study highlights the importance of both an early diagnosis and early starting of therapy with outcome and productive life. ASD is a global health problem with its

prevalence increasing in recent years and its average age of diagnosis remaining high due to delay in the identification of ASD symptoms.

Early identification of certain symptoms according to the child's age is of utmost important. Although Children with ASD have higher screen time, screen time is one of the modifiable risk factors for ASD. Certain antenatal and familial risk factors although statistically not significant but contribute higher risk for ASD like higher birth order, consanguinity, maternal hypertension, artificial reproduction techniques, higher maternal and paternal age and family history of psychiatric illness. Parents' education and awareness for therapy contribute significantly role in the outcome of a child.

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