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Prevalence of Autism Spectrum disorder in 18 to 24 months of age by MCHAT screening

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Abstract

Background

Autism spectrum disorder (ASD) is a neurodevelopmental condition marked by challenges in social communication and the presence of restricted interests and repetitive behaviors. With the DSM-5, ASD is now conceptualized as a spectrum diagnosis, consolidating the separate pervasive developmental disorder (PDD) diagnoses from the DSM-IV, including autistic disorder, Asperger's disorder, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS), into one. Notably, Rett syndrome is no longer classified under ASD in DSM-5, being recognized as a distinct neurological disorder. ASD profoundly impacts an individual's social interaction abilities and communication skills. Those with autism commonly experience difficulties in social interactions and exhibit repetitive and restricted patterns of behavior, interests, and activities, which can vary in severity along the spectrum.

Methods

The present study was a cross-sectional retrospective study of children who were between 18 months to 24 months of age attending Pediatric OPD at GMC Amritsar and were assessed for autism spectrum disorder using the M-CHAT-R scale (by recall memory of parents).The data was tabulated in Microsoft Excel and analyzed with SPSS V.24 software.

Results

In the present study, the majority of the cases were having age of 18 months which included 226 (32.3%) followed by 24 months having 175 (25%) and 20 months that had 144 (20.6%) cases. 105 (15%) cases had age of 20 months. The least no of cases 06 (0.85%) had the age of 21 months. The mean age of the cases is 20.66 months. 379 (54.14%) were males while 321 (45.86%) were females. The male-to-female ratio was 1.2:1.

Conclusion

Certainly, it is imperative to conduct national

Access this article online :

Quick Response Code:

Website :
https://ijdbp.in

DOI :
https://doi.org/10.5281/zenodo.10973464

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(Official Journal of IAP Chapter of Neurodevelopmental Pediatrics)

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epidemiological studies utilizing alternative approaches to discern the trends in Autism Spectrum Disorder (ASD) prevalence. Continuing research endeavors to thoroughly grasp the mechanisms underlying these structural abnormalities and how they evolve over time. This survey has the potential to facilitate the creation of an effective collaborative program between the government and non-governmental organizations (NGOs). Early identification of ASD in children could pave the way for timely interventions, enabling these individuals to make significant contributions to society and the nation through proper training and education. It is acknowledged that a larger sample size may be necessary for the study to more confidently determine the prevalence of autism in very young children.

Keywords

Autism, Neurodevelopment disorder, M-CHAT-R scale

INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental condition distinguished by challenges in social communication and the display of restricted interests and repetitive behaviors [1]. The DSM-5 introduced the idea of a spectrum diagnosis for ASD, consolidating the individual pervasive developmental disorder (PDD) diagnoses from DSM-IV, including autistic disorder, Asperger's disorder, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS), into a unified classification. Rett syndrome is no longer included under ASD in DSM-5 as it is considered a discrete neurological disorder. A separate social (pragmatic) communication disorder (SPCD) was established for those with disabilities in social communication, but lacking repetitive, restricted behaviours.

Furthermore, severity level descriptors were introduced to assist in classifying the level of assistance required by individuals with ASD. This updated definition aims for greater precision and strives to facilitate earlier diagnosis of ASD. [2]. Nevertheless, research projecting the potential consequences of transitioning from the DSM-IV to the DSM-5 has suggested a decrease in the prevalence of ASD [3,4]. Furthermore, there has been apprehension regarding whether children previously diagnosed with PDD-NOS would meet the criteria for an ASD diagnosis under the new classification. [4-6].

Autism spectrum disorder (ASD), aneurologicaldevolopmental disorder that has severe effects on an individual's ability to interact with others and communicate appropriately. Individuals having autism faces difficulties in social interactions and how repetitive and restricted patterns of behaviour, interest, and activities which may vary in severity across the continuum. They have trouble in linking words with their meanings, do not like changes in an already established routine, and will act in unexpected, abnormal ways. They exhibit verbal and nonverbal communication delays and problems. They have poor eye contact, do not respond to name-calling, and speak slowly. A correct diagnosis of autism can be made as early as 18-24 months of age because it is during this time that characteristics pertaining to the age start showing, distinguishing typical development from atypical development or delayed development. [7] Different reports provide diverse estimates regarding the magnitude and consequences of this transition. A particular study indicated that using only parental reports of ASD symptoms, the DSM-5 criteria successfully identified 91% of children previously diagnosed with clinical DSM-IV PDD.[8]

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According to the World Health Organization (WHO), the global prevalence of ASD is estimated at 0.76%, yet this figure represents only around 16% of the total global child population. [9]. The Centers for Disease Control and Prevention (CDC) approximates that approximately 1.68% of children in the United States aged 8 years (equivalent to 1 in 59 children) receive a diagnosis of ASD.[5,10] Within the United States, ASD diagnoses reported by parents averaged slightly higher in 2016, reaching around 2.5%.. The prevalence of ASD in the US more than doubled between 2000–2002 and 2010–2012 according to Autism and Developmental Disabilities Monitoring Network (ADDM) estimates [5]. Although it may be too early to comment on trends, in the US, the prevalence of ASD has appeared to stabilize with no statistically significant increase from 2014 to 2016 [11]. Changing diagnostic criteria may impact prevalence and the full impact of the DSM-5 diagnostic criteria has yet to be seen [10].

Over the last twenty years, there has been a significant rise in ASD prevalence estimates among 8-year-old children according to data from the ADDM Network, increasing from 6.7 per 1,000 (one in 150) in 2000 to 23.0 per 1,000 (one in 44) in 2018 [12,13]. Additionally, earlier data indicate that ASD prevalence among White children was 50% higher compared to Black or African American (Black) or Hispanic children. Similarly, robust associations between autism prevalence and higher socioeconomic status were observed in ADDM Network sites during 2002–2010 [14]; however, this association was much more variable in 2018 [13]. These trends have mostly been understood as advancements towards more fair recognition of ASD, especially for children in demographics with limited access to or encountering greater obstacles in receiving services, such as diagnostic assessments. Nonetheless, persistent inequalities regarding co-occurring intellectual disability persist, with Black children representing the highest proportion among all children with ASD identified with this condition. [5, 15].

Screening tools for ASD in this population include the Modified Checklist for Autism in Toddlers, Revised, with Follow-up (M-CHAT-R/F) and Survey of Wellbeing of Young Children (SWYC) [16,17]. Signs of concern in preschool-aged children could involve restricted pretend play, unusual or intensely concentrated interests, and inflexibility. Meanwhile, in school-age children, observable behaviors may include a tendency towards literal or concrete thinking, difficulty grasping emotions, and potentially displaying an interest in peers while lacking conversational abilities or appropriate social interaction skills. If there is suspicion of ASD in these groups, screening tools available include the Social Communication Questionnaire (SCQ), Social Responsiveness Scale (SRS), and Autism Spectrum Screening Questionnaire (ASSQ) [18-20].

The DSM-5 diagnostic criteria for Autism Spectrum Disorder (ASD) include two primary components:

(A) Enduring deficits in social communication and social interaction. (B) Patterns of restricted and repetitive behavior, interests, or activities.

A child can exhibit all A criteria as young as 2 years old if they fail to respond to their name, display limited or no joint attention, and demonstrate a lack of reciprocal interaction. An illustration of the B criteria in a toddler might involve an intense fascination with a play telephone, during which they do not interact with their mother, respond to their name, or share enjoyment with

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their mother regarding the phone. Adherence to rigid routines can result in challenges during transitions and may lead to disruptive behaviors, such as tantrums. [21].

MATERIALS AND METHODS

The present study was a cross sectional retrospective study children who were between 18 months to 24 months of age attending Pediatric OPD at GMC Amritsar were assessed for Autism Spectrum disorder using M-CHAT-R scale (by recall memory of parents). Study period one year. A total of 700 toddlers were screen after recall of things from the parents

STUDY DESIGN: Cross Sectional Study

STUDY SITE: Department Of Pediatrics, Government Medical College, Amritsar

STUDY SUBJECTS-Toddler of age group 18 to 24 months of age

INCLUSION CRITERIA

1. Children age between 18 months to 24 months who are attending outpatient department in Government Medical College Amritsar

2. Those Children for whom informed consent is obtained from parents.

EXCLUSION CRITERIA

1. Children with visual or hearing impairment.

2. Children diagnosed with neurodegenerative disorder / presence of any neurological deficits.

3. Children for whom consent couldn't be obtained from parents

STATISTICAL ANALYSIS

The information was organized in Microsoft Excel and processed using SPSS Version 24 software. Continuous variables were described using measures of central tendency such as mean and standard deviation, while categorical variables were summarized using frequency and percentage.

RESULTS

The present cross sectional retrospective study was conducted on toddlers of age between 18 to 24 months in the Department OfPaediatrics, Government Medical College, Amritsar. The data was compiled through a set of questionnaires and following observations were noted.

Table 1: Distribution of cases on the basis of age group

Age (in months)	Number	%age
18	226	32.3
19	34	4.85
20	144	20.6
21	06	0.85
22	105	15
23	10	1.4
24	175	25
Total	700	100

In the present study, majority of the cases were having age of 18 months which included 226 (32.3%) followed by 24 months having 175 (25%) and 20 months that had 144 (20.6%) cases. 105 (15%) cases had age of 20 months. The least no of cases 06 (0.85%) had the age of 21 months. The mean age of the cases is 20.66 months.

Table no 2: Distribution of cases on the basis of gender of the case

Gender	Number	%age
Male	379	54.14
Female	321	45.86
Total	700	100

In the present study, 379 (54.14%) were males while 321 (45.86%) were females. The ratio of male to female was 1.2:1.

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Table no 3: Distribution of cases on the basis of Mode of delivery

Mode of Delivery	Number	%age
LSCS	546	78
Normal Vaginal Delivery	154	22
Total	700	100

In the present study, majority of cases underwent LSCS in 546 (78%) cases while

154 (22%) had the birth through normal vaginal delivery.

Table no 4: Distribution of cases on the basis of place of delivery

Place of Delivery	Number	%age
Government Hospital	598	84.4
Private Hospital	102	14.6
Total	700	100

In the present study, 598 (84.4%) births included in the study took place in the Government Hospital while 102 (14.6%) took place in private hospital.

Table no 5: Distribution of cases on the basis of Breast Feeding

Breast Feeding	Number	%age
Exclusive Breast Feeding	636	90.9
Sub Optimal Breastfeeding	64	9.1
Total	700	100

In the present study, exclusive breast feeding was present in 636 (90.9%) cases while in 64 (9.1%) Sub optimal Breastfeeding was present.

Table no 6 : Distribution of cases on the basis of Immunization status

Immunization status	Number	%age
Fully Immunized	675	96.4
Partially Immunized	25	3.6
Total	700	100

In the present study, Fully immunized children were present in 675 (96.4%) cases while in 25 (3.6%) Partially Immunized were present.

Table no 7: Distribution of cases on the basis of Parents Education

Parents education	Number	%age
Both parents ≥ 12 standard	215	30.7
One parents ≥ 12 standard	289	41.3
Both parents ≤ 12 standard	196	28
Total	700	100

In the present study, in 289 (41.3%) cases, the parents of children had only one parent that had education ≥ 12 standard, while in 215 (30.7%) cases both parents had education of ≥ 12 standard while in 196 (28%) both parents had education of ≤ 12 standard.

Table no 8: Distribution of cases on the basis of M chat score

M chat SCORE	Number	%age
0	621	88.7
1	67	9.6
2	6	0.85
3	0	0.0
4	0	0.0
5	1	0.14
6	1	0.14
7	3	0.43
8	1	0.14
9	0	0.0
10	0	0.0
11	0	0.0
12	0	0.0
13	0	0.0
14	0	0.0
15	0	0.0
16	0	0.0
17	0	0.0

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18	0	0.0
19	0	0.0
20	0	0.0
TOTAL	700	100

In the present study, majority of the cases 621 (88.7%) had zero score followed by one score in 67 (9.7%) cases, two score in 6 (0.85%), seven in 3 (0.43) and 01(0.43%) cases present in five, six and eight score each.

Table no 9: Distribution of cases on basis of severity of autism spectrum disorder

Screening positive	Number	%age
No (0 -1)	688	98.3
Mild (2-8)	11	1.56
Severe (8-20)	01	0.14
Total	700	100

In the present study, based on screening positive on the basis of M chat score, in 688 (98.3%) cases no autism spectrum disorder, mild form present in 11 (1.56%) cases and severe form in 01(0.14) cases.

Table no 10: incidence and Period Prevalence of autism spectrum disorder in the cases

Autism Disorder	Incidence	Period Prevalence
No (0 -1)	688	98.3%
Mild (2-8)	11	1.56%
Severe (8-20)	01	0.14

In the present study, incidence of severe autism spectrum disorder is 1 while the period prevalence of severe autism spectrum disorder is 0.14%.

DISCUSSION

The present study was conducted in the department of Medicine, conducted in the indoor patients of Pediatrics, Government Medical College, Amritsar for the period of 12 months. A total of 700 toddlers and their parents were interviewed for the study and the observations were recorded and now they are being compared and discuss with the previous studies by various authors.

In the present study, majority of the cases were having age of 18 months which included 226 (32.3%) followed by 24 months having 175 (25%) and 20 months that had 144 (20.6%) cases. 105 (15%) cases had age of 20 months. The least no of cases 06 (0.85%) had the age of 21 months. The mean age of the cases is 20.66 months. The majority of the studies conducted included the children of same age group as that of present study though the frequency of toddlers in age was different in the various studies. The present study can be compared with studies conducted by **Kumar et al(2023)**, **Ping et al (2014)**, **Wang et al (2018)** and **Raina et al (2015)**. The findings of the present study are different from the studies conducted by **Zhang et al (2022)** where the mean age of the children was the mean age at diagnosis for children was 23.1 ± 4.55 months and Hoang et al (2019) where the screening study was conducted in the age group of 2 to 8 years. The probable reason for difference can be that full clinical features of ASD might not appear at this low age range and the diagnosis might be difficult at this age.

In the present study, 379 (54.14%) were males while 321 (45.86%) were females. The ratio of male to female was 1.2:1. The findings of the present study can be compared to the study conducted by **Hoang et al (2019)** wherethere were more boys (53.6%) than girls (46.4%) and **Ping et al (2014)** where majority of toddlers 51.8% were male in the study.

In the present study, based on screening positive on the basis of M chat score, in 688 (98.3%) cases no autism spectrum disorder, mild form presents in 11 (1.56%) cases and severe form in 01(0.14)

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cases. The findings can be compared with study conducted by **Kumar et al (2023)**where Out of the 253 boys, majority of them, i.e., 52.52% fell in the range of mild-moderate autism. 85 boys, i.e. 28.6% were severely autistic while only 12 out of the 253 boys showed minimal or no symptoms of autism. Out of the 44 girls, only 2 of them, i.e., 0.67% were in the non-autistic range showcasing minimal to no symptoms of autism. 8.08 % of the 44 girls were in the mild-moderate autism spectrum range. Only 18 out of 44 participants i.e., 6.06 % of girls were in the severe autism range.

In the present study, incidence of severe autism spectrum disorder is 1 while the period prevalence of severe autism spectrum disorder is 0.14%. No statistically significant variances were observed in ASD prevalence across other socio-demographic factors. The outcomes of this study are open to comparison with research conducted in different global regions.The findings is similar to the study conducted by **Zeidan et al (2021)** which observed that approximately 1/100 children are diagnosed with autism spectrum disorder around the world. The present study can be compared with studies conducted by **Eom et al (2022)** which observed that Over the 11-year study period, there was an escalation in the prevalence of ASD among preschool children aged 2 to 5 years, rising from 0.06% to 0.23%.

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In another study by **Hoang et al (2019)**where in urban settings, the prevalence of ASD stood notably higher at 1.238% compared to rural areas where it was 0.580%. Additionally, children whose mothers worked as farmers exhibited a significantly higher prevalence of ASD at 1.054% compared to children of mothers employed as government staff, where the prevalence was 0.497%.

The results of the present study are in concordance with the study conducted by **Salari et al (2022)** where The global prevalence of ASD was estimated at 0.6% with a 95% confidence interval ranging from 0.4% to 1%. Subgroup analyses revealed that the prevalence of ASD in Asia, America, Europe, Africa, and Australia was consistent at 0.4%.The present study is different from the study conducted by **Wang et al (2018)** where based on diagnostic criteria the pooled prevalence of ASDs was 39.23 per 10,000; specifically, the prevalence of autism was 10.18 per 10,000 and **Zhang et al (2022)** where In this community-based sample, the diagnostic rate of ASD was found to be 0.32%. Furthermore, during subsequent well-child visits and follow-up, 12 children initially screened as negative were later diagnosed with ASD. The average diagnostic rate of ASD increased to 0.43% when toddlers were followed up until 3 years old. The variance in sample size and environmental factors could potentially account for this difference. The prevalence reported in this study contrasts with the notably higher figures of 168 per 10,000 in a US survey and 264 per 10,000 in a South Korean survey. This difference could stem from the narrower age range considered in this study, potentially leading to challenges in diagnosing ASD when full clinical features may not yet be fully apparent. Other important causes of variation were the methodological differences in the case definition and case-finding procedures and diagnostic criteria.

CONCLUSION

Certainly, it is imperative to conduct national epidemiological studies utilizing alternative approaches to discern the trends in Autism Spectrum Disorder (ASD) prevalence. The results indicate anomalies in early brain development during the clinical progression of autism. Ongoing

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research aims to comprehensively understand the mechanisms behind these structural abnormalities and their longitudinal evolution. In-depth investigations into brain structural irregularities are essential to accurately estimate the actual prevalence of autism, necessitating further studies to uncover the underlying reasons for these findings. This survey has the potential to facilitate the creation of an effective collaborative program between the government and non-governmental organizations (NGOs). Early identification of ASD in children could pave the way for timely interventions, enabling these individuals to make significant contributions to society and the nation through proper training and education. Recognizing the rarity of autism in childhood, it's acknowledged that a larger sample size may be necessary for the study to more confidently determine the prevalence of autism in very young children.

Financial Support and sponsorship : Nil.

Conflicts of interest : There are no conflicts of interest.

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