

ORIGINAL RESEARCH**A study to evaluate the association of age, gender and the socio-demographic characteristics among toddlers (16 months – 30 months age group) screened positive for risk of having Autism spectrum disorder (ASD) by using M-CHAT R/F**

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Received: 20 January, 2022

Accepted: 13 February, 2022

ABSTRACT

Introduction: Autism is one of the heterogenous neurodevelopment disorder classified under Pervasive spectrum Disorder is characterized by three core deficits i.e. impaired communication skills, impaired social interaction (reciprocal) and repetitive, restricted, stereotyped behavioral patterns. Early identification of toddlers at risk for developing autism and timely referral and appropriate intervention strategies is crucial to achieve better outcomes for these children. Thus, the present study was conducted at tertiary care centre to assess the percentage of toddlers (16months – 30months age group) attending well baby clinic in Pediatric OPD who screens positive for risk of having Autism spectrum disorder (ASD) by using M-CHAT R/F.

Materials and Method: The present descriptive cross sectional study was conducted among toddlers belonging to age range of 16-30 months visiting well baby clinic during the study period. All the parents were enquired regarding the condition of child and activity using M-CHAT R/F questionnaire. Association of Autism spectrum disorder with various factors was assessed using Chi square test. Multivariate analysis was done to determine the independent factors associated with ASD. P value of less than 0.05 was considered statistically significant.

Results: A significant association of moderate risk of autism spectrum disorder with younger age (16 to 24 months) and male gender (83.3%) ($p < 0.05$). However, no association of Autism spectrum disorder with socioeconomic status of the family ($p > 0.05$) was found. The risk of ASD was significantly higher in children belonging to less than 24 months of age (OR-1.28; 95% CI-1.013-1.55, $p < 0.05$) as compared to children above 24 months of age.

Conclusion: The present study concludes that a significant association of moderate risk of Autism spectrum disorder with younger age (16 to 24 months) and male gender and the risk of ASD was significantly higher in children belonging to less than 24 months of age as compared to children above 24months of age. Early identification and introduction of appropriate intervention strategies might help in preventing the long term complications in

the form of neuro cognitive dysfunction and intellectual ability of the child.***Keywords: Autism; Impaired communication skills; Stereotyped behavioral patterns*****INTRODUCTION**

Autism is one of the heterogeneous neuro development disorder classified under Pervasive spectrum Disorder is characterized by three core deficits i.e. impaired communication skills, impaired social interaction (reciprocal) and repetitive, restricted, stereotyped behavioral patterns.¹ The term “Autism” was first coined in 1908 by a Swiss Psychiatrist, Sir Eugen Bleuler to describe the symptoms associated with unconscious fantasy, severe schizophrenia and hallucinations among the infants.² Later in 1943, Leo Kanner, an American Psychiatrist, first used the term “early infantile autism” for describing the children lacking interest in other individuals.³ Hans Asperger, an Australian Pediatrician described a milder form of autism with higher intellectual abilities in 1944. This syndrome was termed Asperger syndrome after his name, and this form has been attached to higher functioning form of autism.⁴ In 1980s, the term pervasive developmental disorder (PDD) was used to include five disorders namely Autistic Disorder, Asperger disorder (high functioning autism), Childhood dis integrative disorder, Rett disorder and Pervasive developmental disorder- not otherwise specified (PDD-NOS).¹ According to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) and International Classification of Diseases, Tenth Edition (ICD-10), the three disorder of PDD namely autistic disorder, Asperger disorder and PDD-NOS are included under the umbrella of Autism spectrum disorder (ASDs).^{5,6}

Early identification of toddlers at risk for developing autism, and distinguishing autism from other developmental disorders, is highly recommended so that timely referral and appropriate intervention strategies (Early Intervention) can be implemented as soon as possible to achieve better outcomes for these children. Various screening tools have been used for diagnosis of ASD in high risk children. Recently, M-CHATR/F i.e. Modified Checklist for Autism in Toddlers, Revised, with Follow-Up is commonly used for screening of ASD in International settings.^[7,8] With the above background, the present study was conducted at tertiary care centre to assess the percentage of toddlers (16months – 30months age group) attending well baby clinic in Pediatric OPD who screens positive for risk of having Autism spectrum disorder (ASD) by using M-CHAT R/F.

MATERIALS AND METHOD

The present descriptive cross sectional study was conducted at Well baby clinic, at Department of pediatrics, People’s Hospital, Bhopal during the study period of 18 months i.e. from 1st December 2020 to 30th May 2022 among toddlers belonging to age range of 16-30 months visiting well baby clinic during the study period. The study was commenced after taking ethical permission from the institutional ethical committee (IEC No: PCMS/OD/2020/2181/10) and written consent was obtained from the parents of all the children after explaining them the purpose of study. The parents were ensured regarding the confidentiality of data and the option to withdraw from the study was always kept open.

Inclusion criteria consisted of toddlers in the age group 16-30months attending well baby clinic. Exclusion criteria consisted of children in the same age group with delayed development due to a known cause or disorder (ex: birth asphyxia, down syndrome/other known genetic disorder, cerebral infection etc.) and parents not giving consent to participate in the study. Base line details of the child and family related to socio demographic variables such as age and sex of child, socio economic status were obtained and documented in proforma. Detailed antenatal, intranatal and postnatal history was obtained from all the parents. History regarding previous admission in the child or development delay in sibling of the child was also obtained and recorded. All the parents were enquired regarding the

condition of child and activity using M-CHAT R/F question naire.^{7,8} Based upon the response of parents, toddlers were evaluated and screened for autism spectrum disorder as

- Low risk-<3
- Moderaterisk-3-7

In case a child fails the test (score ≥ 3 or failing in 2 critical items), parents were asked to respond to M-CHAT R/F (flow chart) for only those points (items) in which the toddler failed. Children in low risk category (score <2) did not required any follow up. Children with moderate risk of ASD (score 2-7) were subjected to regular follow up with child psychologist/ special health educator where as child with high risk(score ≥ 8) were immediately referred to developmental Pediatrician/ psychiatrist for diagnostic evaluation and early intervention.

Data was compiled using MS Excel and analyzed using IBMSPSS software version

20. Categorical and continuous variables were represented as frequency (percentage) and mean (standard deviation) respectively. Association of Autism spectrum disorder with various factors was assessed using Chi square test. Multivariate analysis was done to determine the independent factors associated with ASD. P value of less than 0.05 was considered statistically significant.

RESULTS

The present study was conducted on a total of 350 toddlers who were enrolled in the study and screened for the risk of ASD using MCHAT-R/F.

Table1: Distribution of cases according to age

| Age(months) | Frequency(n=350) | Percentage |
|-------------|------------------|------------|
| 16 to 24 | 255 | 72.9 |
| 25 to 30 | 95 | 27.1 |

Mean age of toddlers enrolled in present study was 22.69 \pm 4.8 months and majority of cases (72.9%) belonged to age range of 16 to 24 months. Only 27.1% cases belonged to age range of 25 to 30years (table 1).

Table2: Distribution of cases according to gender

| Gender | Frequency(n=350) | Percentage |
|--------|------------------|------------|
| Male | 179 | 51.1 |
| Female | 171 | 48.9 |

We reported slight male predominance in our study, with male: female ratio of 1.05:1. Majority of cases were males (51.1%), where as 48.9% cases enrolled in our study were females (table 2).

Table 3: Distribution according to socio economic status

| Socioeconomic status | Frequency(n=350) | Percentage |
|----------------------|------------------|------------|
| Upper | 0 | 0 |
| Upper middle | 12 | 3.4 |
| Lower middle | 172 | 49.1 |
| Upper lower | 166 | 47.4 |
| Lower | 0 | 0 |

Majority of cases in our study belonged to lower middle socio economic status (49.1%), followed by 47.4% cases belonging to upper lower and 3.4% cases belonging to upper middle socio economic status (table 3).

Table 4: Distribution of cases according to Autism spectrum disorder

| Autism spectrum disorder | Frequency(n=350) | Percentage |
|--------------------------|------------------|------------|
| Low risk | 338 | 96.6 |
| Moderate risk | 12 | 3.4 |

M-CHAT R/F score was used to determine the risk of ASD. Out of 350 cases, 96.6% toddlers were at low risk for ASD where as 3.4% cases were at moderate risk of ASD. None of the child in our study was found to be at high risk of ASD (table 4).

Table 5: Association of ASD with socio demographic factors

| Socio demographic factors | | Autism spectrum disorder | | | | χ^2 | P value |
|---------------------------|--------------|--------------------------|------|------------|-------|----------|---------|
| | | Low | | Moderate | | | |
| | | risk(n=338) | | risk(n=12) | | | |
| | | n | % | n | % | | |
| Age of child (months) | 16 to 24 | 243 | 71.9 | 12 | 100.0 | 4.6 | 0.03 |
| | 25 to 30 | 95 | 28.1 | 0 | 0 | | |
| Gender | Male | 169 | 50.0 | 10 | 83.3 | 5.15 | 0.023 |
| | Female | 169 | 50.0 | 2 | 16.7 | | |
| Socioeconomic status | Upper middle | 11 | 3.3 | 1 | 8.3 | 0.96 | 0.62 |
| | Lower middle | 166 | 49.1 | 6 | 50.0 | | |
| | Upper lower | 161 | 47.6 | 5 | 41.7 | | |

In present study, we reported a significant association of moderate risk of Autism spectrum disorder with younger age (16 to 24 months) and male gender (83.3%)($p < 0.05$). However, we observed no association of Autism spectrum disorder with socio economic status of the family ($p > 0.05$) (table 5).

Table 6: Multivariate analysis for predicting the risk of Autism spectrum disorder according to age, gender, socio economic status

| Variables | | OR | 95%CI | Pvalue |
|----------------------|--------------|-----------|------------|--------|
| Age | <24months | 1.28 | 1.013-1.55 | 0.04 |
| | >24 months | Reference | | |
| Gender | Male | 4.85 | 0.93-25.3 | 0.06 |
| | Female | Reference | | |
| Socioeconomic status | Upper middle | 2.4 | 0.62-8.8 | 0.09 |
| | Lower middle | 0.92 | 0.23-3.7 | 0.91 |
| | Upper lower | Reference | | |

The risk of ASD was significantly higher in children belonging to less than 24 months of age (OR-1.28; 95% CI-1.013-1.55, $p < 0.05$) as compared to children above 24months of age (table 6).

DISCUSSION

It is essential to recognize the features of ASD as early as possible so that appropriate intervention strategies can be implemented early to achieve better outcomes. The present study entitled "Screening for Autism Spectrum Disorder using M-CHAT R/F, in children of age group 16 months to 30 months attending well baby clinic" was conducted on a total of 350 toddlers who were screened for the risk of ASD using a validated tool MCHAT-R/F. The mean age of children enrolled in our study was 22.69 ± 4.8 months and 51.1% cases were males.

For screening of Autism spectrum disorders in children, various screening tools have been used.⁹⁻¹¹ M-CHAT is one of the most widely used screening tool for screening of Autism spectrum disorder in children as it is easily accessible and low cost tool for screening of ASD.^{7,8} Recently, the modified version of M-CHAT i.e. M-CHAT R/F (Modified Checklist for Autism in Toddlers, Revised, with Follow-Up) is recommended for screening of ASD in International settings.^{7,8} This is a 20 item screening tool to be filled by the parents of the toddlers and F component of the scale helps in reducing false-positive rate as when the score range between 3 and 7, follow up is indicated.⁸ The scale is intended to screen children belonging to age group of 16 months to 30 months.⁸ Robins DL et al used M-CHAT R/F for screening ASD and reported that children with total score of ≥ 3 at initial screening and ≥ 2 after follow-up had 47.5% high risk of being diagnosed with ASD and 94.6% risk of developmental delay.⁸

Based upon this scale, we screened 12 out of 350 (3.4%) children to be at moderate risk of ASD. All these children with moderate risk were subjected to follow up. The findings of presents study were supported by the findings of Oner O et al in which 9.8% of children were screened positive for ASD using M-CHAT R/F in Turkey and at follow up, 39.7% of initial screen-positive children had ASD.¹² Zhang Y et al screened 11,190 toddlers belonging to 18 to 24 months with M-CHAT R/F and of them a total of 36 toddlers were screened positive with a diagnostic rate of 0.32%.¹³ The lower risk of ASD in reference study as compared to present study could be attributed to difference in the study setting. We conducted this study in Hospital based setting whereas the reference study was done in a community setting.

Jaisooriya TS et al in their community based study in Kerala used M-CHAT R scale on 6237 toddlers and reported the score of 3 and above in 341 toddlers (5.5%), of them, medium risk was reported in 259 toddlers (4.2%) whereas 82 toddlers (1.3%) had high risk of ASD.¹⁴ Metgud DC et al used M-CHAT scale for screening of ASD in 16-30 Months toddlers and reported the prevalence of ASD as 0.19%.¹⁵ Joseph J et al (2021) in their study in North India (Rohtak, Haryana), found 0.55% and 6.57% toddlers to be at moderate and high risk of ASD respectively.¹⁶

As the scale is intended to be used in children belonging to 16 months to 30 years, we included children of this age group. Mean age of children was 22.69 ± 4.8 months, with 51.1% cases being males. We observed moderate risk of ASD to be significantly associated with younger age of child (16 to 24 months) on both univariate as well as multivariate analysis ($p < 0.05$). The risk of ASD was documented to be significantly higher among males (83.3% vs 16.7%; $p < 0.05$). However, we observed no association of Autism spectrum disorder with socio economic status of the family ($p > 0.05$).

The mean age of toddlers enrolled in a study of Jaisooriya TS et al was $20.13 (\pm 2.72)$ and 50.3% were males.¹⁴ On the other hand, the mean age of children screened for ASD in a study of Metgud DC et al was 24.5 ± 5.04 months and the prevalence of ASD was higher in upper-middle class and children belonging to age group of 28–30 months.¹⁵ The mean age at diagnosis of ASD in a study of Zhang Y et al was 23.1 ± 4.55 months and the authors concluded that this tool helped in diagnosing the risk of ASD at least 20 months earlier as compared to those in whom screening was not performed.¹³

The findings of present study were also supported by the findings of Thomas P et al, in which the prevalence of autism was documented to be higher in boys as compared to girls (16 vs 4/1000).¹⁷ Galvan GA et al also observed a significant association of ASD with male gender ($p < 0.05$),¹⁸ supporting our study findings.

Thus, screening of children for ASD at younger age, may help in identification of features of ASD and children at moderate risk and high risk of ASD at younger age. Appropriate interventions at younger age may improve the long term outcome of these children.

CONCLUSION

The present study concludes that a significant association of moderate risk of Autism spectrum disorder with younger age (16 to 24 months) and male gender and the risk of ASD was significantly higher in children belonging to less than 24 months of age as compared to children above 24 months of age. Early identification and introduction of appropriate intervention strategies might help in preventing the long term complications in the form of neuro cognitive dysfunction and intellectual ability of the child. Thus screening of every child for ASD must be made mandatory using this easy to use 20 item tool.

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