International Journal of Contemporary Pediatrics
Arunachalam S et al. Int J Contemp Pediatr. 2024 Feb;11(2):121-126
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20240014

Original Research Article

Screening of children attending well baby clinic for risk of autism using modified checklist for autism in toddlers in a pediatric tertiary care Centre in Chennai

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Received: 29 December 2023
Revised: 04 January 2024
Accepted: 08 January 2024

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ABSTRACT

Background: Autism spectrum disorder is a common neurodevelopmental disorder with core deficits in social communication, interaction, and restrictive/repetitive behavior. Early intervention provides opportunity for good functional outcome. The study aimed to screen children attending well baby clinic for risk of autism using modified checklist for autism in toddlers (MCHAT) questionnaire.
Methods: This descriptive cross-sectional study was conducted on 302 children attending the pediatric well baby clinic. The children aged 16-30 months who met the inclusion criteria were screened for risk of autism using MCHAT.
Results: 20 out of 302 children failed the MCHAT screening, 6.6% of the children were found to be at risk of autism. Boys: girls' ratio was 2:1. Advanced parental age and higher socioeconomic status were found to have significant association with the risk of autism. 70% of children in the at-risk group were first born, 70% of children who failed the MCHAT screen were from a nuclear family.
Conclusions: All toddlers attending the well-baby clinic should be screened for autism by pediatricians. MCHAT is a simple easy to use validated tool to screen for autism in a busy pediatric OPD. Timely referral for comprehensive assessment and intervention can help to improve the outcome in children with autism.

Keywords: Autism spectrum disorder, Screening, MCHAT, Diagnosis, Early intervention

INTRODUCTION

Autism spectrum disorder is a complex neurodevelopmental disorder characterized by persistent challenges with social communication, restricted interests, and repetitive behavior. People with all races, ethnicities, economic background, and all gender can have autism. [1]

The latest statistical data from the CDC in 2023 shows that 1 in 36 children are now diagnosed with autism. Increased awareness and improved identification of milder cases without disability is attributable to increased prevalence rates all over the world.[1]

According to the diagnostic and statistical manual of mental disorders- revised DSM-5, people with ASD often have deficits in social communication and interaction, restricted repetitive behaviors, interests, and activities. These symptoms are present from early childhood and limit everyday functioning. Both components are required for diagnosis of autism.[2,3]

Even in US, the age of parental concerns can be as early as 12-18 months, the diagnosis usually made around 4 years of age, even further delayed in those with low socioeconomic status and those from different ethnic background.[4]

Early diagnosis and intervention are known to improve functional outcome. Screening for risk of autism in toddlers is a prerequisite for early diagnosis.[5]

A simple, quick, reliable, validated tool is pivotal for screening in the community.

The M-CHAT is a simple, validated tool designed to screen for risk of autism in toddlers. A parent can complete the items independently. The M-CHAT does not allow a clinician to make a diagnosis of autism spectrum disorder but is a very useful clinical tool that has excellent sensitivity and specificity. Positive results suggest a high risk for autism spectrum disorder and may necessitate referral.[6]

Aim

Screening of children attending well baby clinic for risk of autism using MCHAT questionnaire and to study the demographic profile of children with risk of autism.

METHODS

Study period

Study conducted from June 2019 to June 2020.

Study design

This is a descriptive, cross-sectional study performed on 302 children attending well baby clinic in Dr. Kamakshi memorial hospital, a pediatric tertiary care centre in Chennai.

Study population

Inclusion criteria

Children in the age group 16-30 months attending the pediatric outpatient department for routine checkup or vaccination, children whose parents gave consent to participate in the study.

Exclusion criteria

Diagnosed case of autism, total lack of expressive language, children with global developmental delay and genetic disorders, parents who did not give consent for participation in the study were excluded.

The children aged 16-30 months who met the inclusion criteria were screened for risk of autism using MCHAT.

Informed consent was taken before data collection. The parents were asked to fill the sociodemographic profile and the MCHAT 23 item yes/no questionnaire during their visit to pediatric outpatient department. The scoring was done by the pediatrician. The parents who were not able to understand the questions were given explanation by the pediatrician with the help of flash cards for easy understanding. The demographic data collected were age of the child, mother's education, father's education, occupation of father, family income, socioeconomic classification, place of residence, type of family, age of mother at childbirth, age of father at childbirth, birth order, birth weight, mode of delivery, gestational age was included. The data analysis was done using Python libraries SciPy. Stats and Pearson correlation coefficient was used to find the factors that has significant statistical correlation.

Those who failed the screen were referred for detailed evaluation to the clinical psychologist/developmental neurologist and were regularly followed up in the child development centre.

MCHAT scoring

Yes/no answers convert to pass or fail response. Children who fail more than 3 items total or 2 critical items are considered to have failed the MCHAT screen. Below is the list of failed responses for each item on the MCHAT.

Bold items (Item numbers 2, 7, 9, 13, 14 and 15) are CRITICAL items (Table 1). Not all children who fail the checklist will meet criteria for diagnosis of autism. However, children who fail the checklist should be referred for developmental evaluation with a specialist.

RESULTS

A total of 302 children were screened with the MCHAT, 143 children were girls and 159 were boys. 20 out of 302 children failed the MCHAT screening. 6.6% of children were identified to be at risk of autism. Boys: girls' ratio was 2:1. The MCHAT result distribution is depicted below (Figure 1).

The score pattern in the study population is tabulated below (Table 2).

Among the 20 children who failed M CHAT screening, 15 children had their total score between 3-5 and 5 children scored more than or equal to 6.

Age distribution (Figure 2)

Among the 20 children who failed the MCHAT screen, 6 children (30%) in the age group of 16-17 months, 8 (40%) and 6 (30%) children in the age group of 18-22 months and 23-30 months respectively were found to be at risk of autism.

Maternal age distribution (Figure 3)

We observed out of 20 children who failed the MCHAT screen, 10 children (50%) with the maternal age of 28-30 years at child birth and 9 (45 %) children with maternal

age of 31-39 years at child birth were found to be at risk of autism.

Paternal age distribution (Figure 4)

We observed that in the failed group 8 children (40%) with paternal age of 31-33 years at child birth and 10 children (50%) with paternal age of 34-45 years at child birth were found to have the risk of autism. The maternal and paternal age was higher in the risk group.

Socioeconomic status distribution (Figure 5)

The 13 out of 20 children (65%) in the risk group belonged to the upper socioeconomic status.

We also observed that 70% of children in the risk group were first born (Figure 6).

Type of family distribution (Figure 7)

We also observed that 70% of children at risk of autism were from nuclear family.

Significant risk factors of autism

There was significant statistical correlation between advanced parental age and risk of autism. Higher socioeconomic status also showed significant statistical association with risk of autism (Table 3).

Table 1: MCHAT scoring.

MCHAT scoring				
1. NO	6. NO	11. YES	16. NO	21. NO
2. NO	7. NO	12. NO	17. NO	22. YES
3. NO	8. NO	13. NO	18. YES	23. NO
4. NO	9. NO	14. NO	19. NO	
5. NO	10. NO	15. NO	20. YES	

Table 2: The score pattern in the study population is tabulated below.

Total score	0	1	1	2	2	3	3	3	4	4	4	5	5	6	6	8	9	Total
Critical score	0	0	1	0	1	0	1	2	1	2	3	1	2	3	4	3	4	
Pass	243	24	4	7	4	0	0	0	0	0	0	0	0	0	0	0	0	282
Fail	0	0	0	0	0	2	2	3	2	2	1	1	2	1	2	1	1	20

Table 3: Significant risk factors of autism.

Variables	Pearson correlation coefficient	
	Coefficient	**P value**
Age of mother at childbirth in years	0.157337943	0.006
Age of father at childbirth in years	0.189991395	0.009
Kuppuswamy socioeconomic classification scale upper (26-29)	0.110226017	0.055

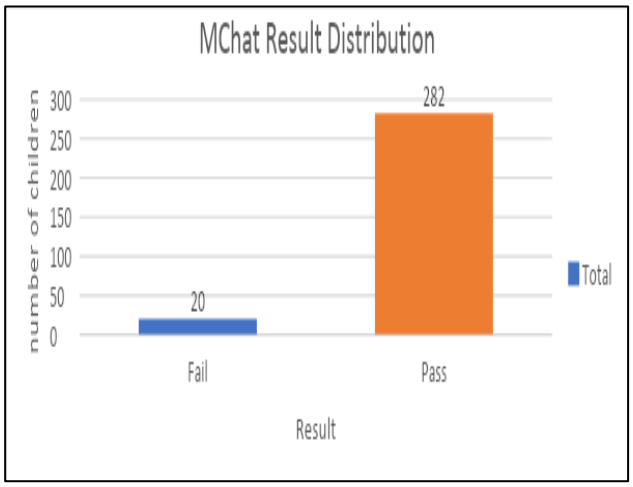

Figure 1: MCHAT result distribution.

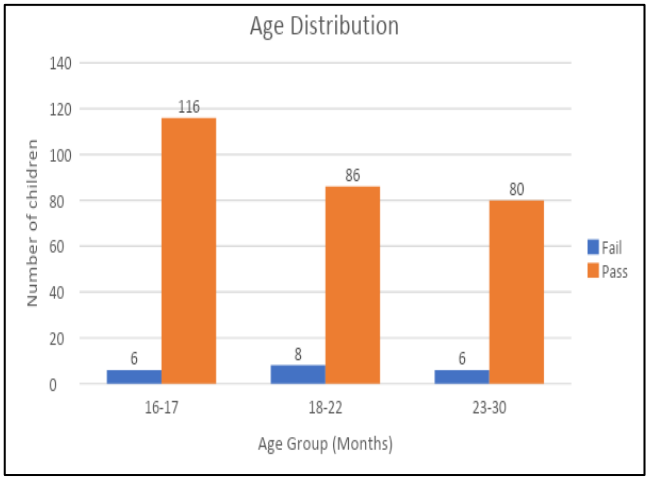

Figure 2: Age distribution.

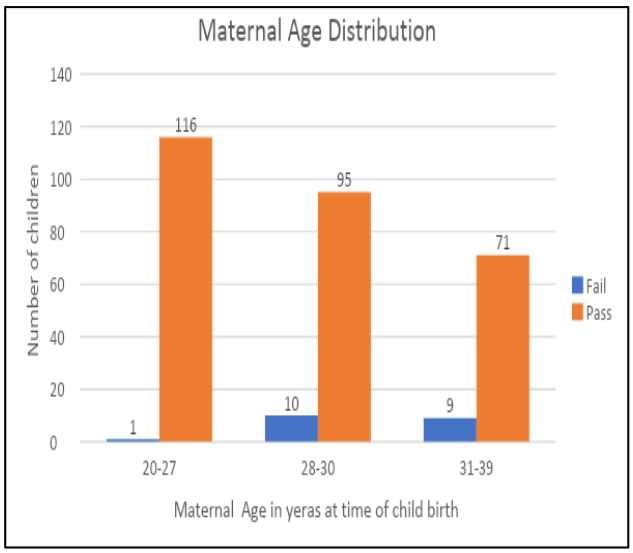

Figure 3: Maternal age distribution.

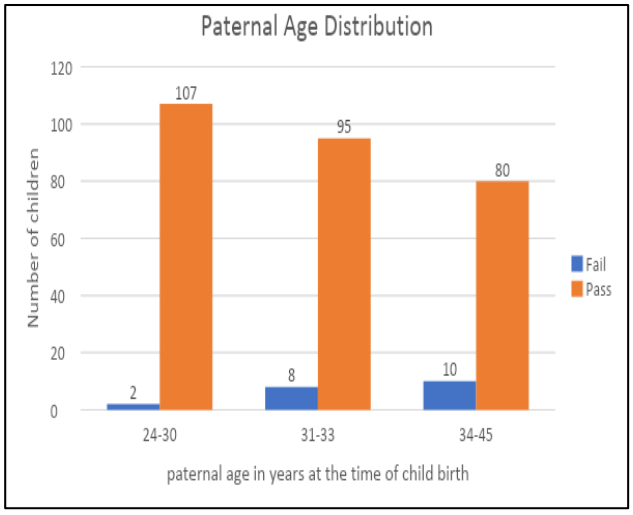

Figure 4: Paternal age distribution.

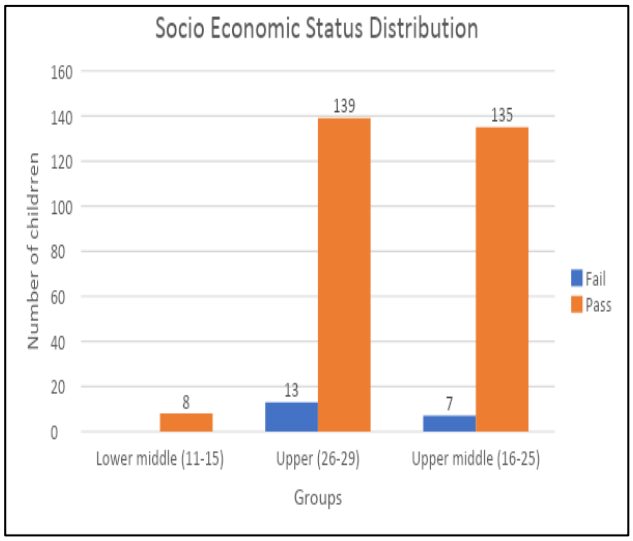

Figure 5: Socioeconomic status distribution.

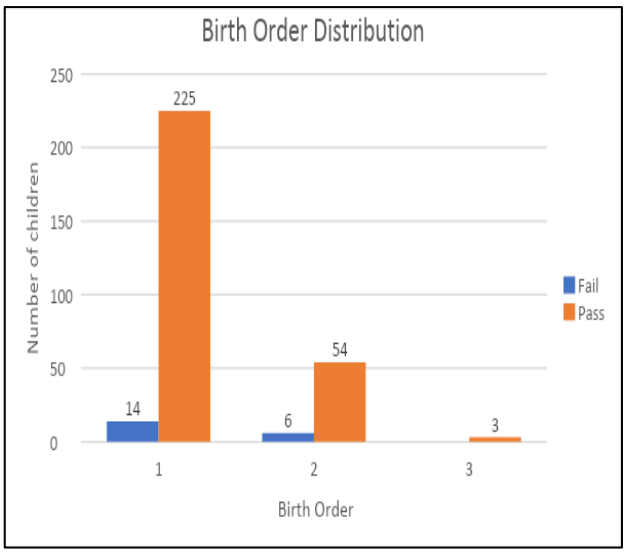

Figure 6: Birth order distribution.

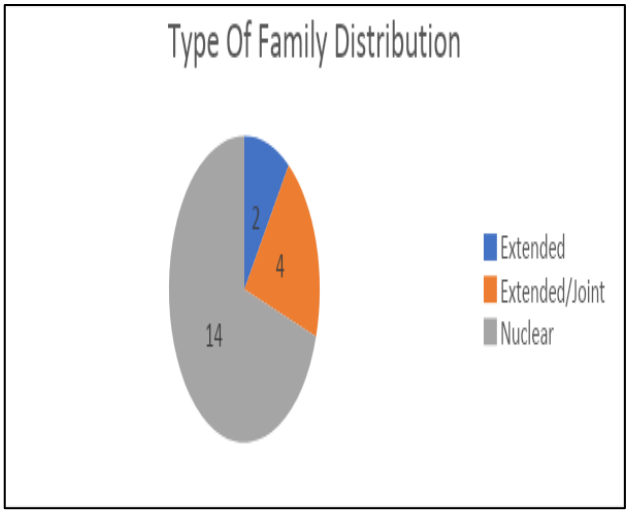

Figure 7: Type of family distribution.

DISCUSSION

The current American academy of paediatrics guidelines recommend routine ASD surveillance at 9,18, and 30 months and ASD specific screening at ages 18 and 24 months.[7,8] This public policy is of salient importance and increasingly recognized that early intervention can lead to better symptom improvement and overall long-term outcome.[9]

Successful universal screening also depends on the availability of standardized and reliable screening tools that are culturally acceptable as an initial critical step.[10]

The MCHAT is one of the most widely used screening instruments worldwide.[6,11-13]

Early indicators of autism are Poor eye contact, limited babbling, absence of pointing, limited reciprocal smile,

not responding to name, obsessive interest on specific object.

Siegel et al, states that a there is a large gap between the age of the child at which the parents had their first concern, the age of first evaluation, and the age of definitive diagnosis.[14] The parents have noted their first concerns for autism as early as 11 months of age and usually when the child is around 17 to 18 months.[15] ASD is currently shown to be reliably diagnosed within the first 36 months of life.

A systematic review in India and southeast Asia population has reported prevalence rate ranging from 0.09% to 1.07% among the children in the age group of 0–17 years with autism spectrum disorder.[16]

It is difficult to detect autism spectrum disorder in very young children, and prompt referral at an optimal age is crucial. Chawarska et al observed that the average age for first parent concern is 14-15 months with a significant number below 11 months.[17] We also observed that in the risk group that 6 out 20 (30%) children were in the age group of 16-17 months and 8 children (40%) were in 18-22 months age group. These findings agree with Gray and Tonge et al who found that parents become concerned about autistic behaviour at the age of 12- 30 months.[18]

ASD was 4.2 times as prevalent among boys than girls as per CDC'S autism and developmental disabilities monitoring network 2021 surveillance. Our results also pointed to the higher risk of autism in boys than girls (4.3% and 2.4 % among boys and girls). This finding was consistent with the finding reported by Itzchak et al.[19] Shu et al in their study observed that autism is more than twice as common in boys as girls.[20]

Our results showed that advanced parental age is found to have significant association with the risk of autism. This was also observed by Lyall et al.[21]Advanced maternal and paternal age is also a risk factor for ASD, with significantly increased risk with each 10-year increase in maternal age.[22]

We observed that children from higher socioeconomic status had the increased risk of autism similar to the observation by Kelly et al and Tsung et al.[23,24.]

We also observed that 70% of children in the risk group were first born. Gardener et al in a meta-analysis showed significant relationship between birth order /parity and risk of autism: 61% risk of ASD was identified among the first-born children compared to those third born or later.[25]

In our study we observed that 70% of children at risk of autism were from nuclear family.

Early intervention and treatment should not be deferred until a final diagnosis is made. We recommend that children who fail M CHAT test should be referred promptly for further assessment and early intervention. This will optimise developmental trajectories and long-term outcome of many affected children as well as improve the quality of life.

Limitation

The limitation of the study is that the sample size is not large enough. MCHAT is a screening test and not a diagnostic test. The test does not confirm that the child has autism. A child who has failed MCHAT is at the risk of autism and warrants further evaluation.

CONCLUSION

All toddlers attending the well-baby clinic should be screened for autism by pediatricians. MCHAT is a simple easy to use validated tool to screen for autism in a busy pediatric OPD. Timely referral for comprehensive assessment and intervention can help to improve the outcome in children with autism.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Arunachalam S, Narayanan R, Jagannathan P. Screening of children attending well baby clinic for risk of autism using modified checklist for autism in toddlers in a pediatric tertiary care Centre in Chennai. Int J Contemp Pediatr 2024;11:121-6.