



Maternal and birth risk factors for children screening positive for autism spectrum disorders on M-CHAT-R



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ABSTRACT

This study was carried out to screen children aged 16–30 months, attending pediatric outpatient department of JIPMER, Puducherry, during June to August 2014, for ASD using modified checklist for autism in toddlers-revised (MCHAT-R) and to find association between maternal, birth and postnatal risk factors with risk of ASD. A total of 350 mother–child pairs with children aged between 16 and 30 months were recruited. M-CHAT-R was administered to all mothers to screen for ASD along with risk checklist. Based on screen result children were classified as ASD (high risk) and no ASD (low and medium risk) group. The association between risk factors and screen positivity for ASD was studied using odds ratio. According to our study, 33 (9.4%) screened positive for ASD. Mean age was 21 months. High mean paternal age at birth (P value 0.025), need for resuscitation at birth (OR 3.4, 95% CI 1.47–8.10), NICU stay >12 h (OR 4.7, 95% CI 2.26–9.94), late initiation of breastfeeding (OR 3.9, 95% CI 1.83–8.39), neonatal seizures (OR 11.8, 95% CI 5.38–26.25) were associated with screen positivity for ASD. After adjusting for confounding, neonatal seizures, and maternal concern about child development were associated with increased odds of screening positive for ASD whereas exclusive breast feeding in the first 6 months of life is associated with decreased odds. Screening for ASD in children with above risk factors might help in early initiation of remedial interventions.

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What is already known on the subject?

- Screening for children with MCHAT-R is helpful in early diagnosis of autism spectrum disorders (ASD).

What this study adds

- Presence of neonatal seizures, parental concern on child's development are associated with increased odds of being high risk for ASD on MCHAT-R. Exclusive breast feeding is associated with decreased Odds of having high risk score for ASD on MCHAT-R.

1. Introduction

Autism spectrum disorder (ASD) is a broad term representing a constellation of neurodevelopmental conditions characterized by

absent or abnormal socialization and communication and the presence of restrictive or repetitive stereotypic behaviors (APA, 2013). ASD is the most severe behavioral disorder in children which stresses parents, families and health care providers (Johnson and Rodriguez, 2013). ASD includes Autism, Childhood disintegrative disorders, Asperger's disorder and Pervasive Developmental Disorder not otherwise specified (PDD NOS). The prevalence of ASD is estimated at 110 per 10,000 U.S. children between 3 and 17 years of age (Kogan et al., 2007). In India, the estimated rate of ASD is 1 per 250 (Action for Autism, 2014). There has been a steady increase in the prevalence of ASD over the past few decades with no clear reason for the same. Two-thirds of children meeting the diagnostic criteria will continue to have lifelong disability. The cause of ASD is thought to be a combination of genetic and unknown environmental factors (Rutter, 2005; Hallmayer et al., 2011). In absence of any proven cure, disability can be reduced by early institution of non-pharmacological interventions. Hence, key factor is early detection of ASD. Existing screening tools are able to detect ASD in children beyond 2 or 3 years of age. It has been shown that using modified checklist for autism in toddlers-revised (MCHAT-R) ASD can be detected in children aged lesser than

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3 years (Robins et al., 2014). Screening for ASD using MCHAT-R has the advantage of identifying high risk infants early. This study focuses on screening children aged 16–30 months attending pediatric outpatient department of JIPMER using MCHAT-R. In this study we also attempt to identify certain maternal, birth and postnatal risk factors that are associated with screen positivity for ASD, on MCHAT-R, at 16–30 months of age. Predicting risk factors might help us in identifying infants soon after birth so that they may be amenable to early intervention.

2. Methodology

This was a cross sectional analytical study, done in the Department of Pediatrics, JIPMER, a tertiary care teaching hospital located in Southern India. This is a Government run hospital and provides substantially subsidized treatment for socioeconomically backward population belonging to rural and semiurban area. The study population of this cross sectional study comprised children aged between 16 and 30 months and their mothers attending the pediatric OPD services (including well baby clinic visits), of this hospital during the period from June 2014 to August 2014. The study objective was to identify children aged between 16 and 30 months at risk for developing ASD using MCHAT-R, and to find the association between the maternal, birth risk factors and the risk of developing ASD. Sample size was calculated using open-epi software assuming a conservative prevalence of ASD at 5% in children between 16 and 30 months, at 90% confidence level with absolute precision of 2.5%, sample size required was found to be 322. To account for dropouts and incomplete data, the final sample size was fixed at 350. To be included in the study each child has to be accompanied by at least one responsible parent, able to speak in English or Tamil. Children with pre existing visual and hearing impairments and acute medical illness were excluded from the study. The study was approved by Institute Ethics Committee for human studies. Participants gave informed consent prior to entry into the study.

A total of 350 children (16–30 months) who attended the pediatrics outpatient department of our hospital along with their mother, and who satisfied the inclusion and exclusion criteria formed the study population. M-CHAT-R was administered to detect risk for ASD in these children. A risk factors checklist for eliciting risk factors including maternal and birth risk factors for ASD was also administered.

2.1. Tools used

Sociodemographic data was collected using a semi-structured proforma.

2.2. M-CHAT-R

This is a simple screening tool, considered a valid tool for early detection of children at risk for ASD compared to existing conventional method (Robins et al., 2014). It is a checklist of 20 commonly observed child behaviors. This requires the mother

to report on presence of specific child behaviors from the checklist as yes/no responses. There are no culturally biased items. Presence of an abnormal behavior was assigned a score of 1 and total score interpreted. A total score of 0–2 suggests a low-risk for ASD (in children <24 months); 3–7 as medium risk for ASD and 8–20 as high risk for ASD. For the purpose of this study, children were considered positive for diagnosis of ASD if they fell under the high risk category of MCHAT-R and were referred for psychiatric evaluation. Those children who were found to be in low to medium risk category were advised regular follow-ups. Even though they may not develop ASD, these children are likely to manifest other developmental disorders.

2.3. Risk factors checklist

A list of about 40 risk factors for developing ASD including frequently researched maternal and birth related factors was created. This was based on inputs from literature review and from two external subject experts, one of them was a psychiatrist and other was a pediatrician with experience of working with child developmental disorders. The mothers were then interviewed using this checklist for the presence of maternal and birth risk factors which had 'yes' or 'no' type of questions and in-addition, wherever possible, the information was also collected from medical records in their possession. Some items such as age of the father and mother at the time of birth of index child, were taken as continuous variables.

2.4. Statistical analysis

A descriptive statistical analysis followed by inferential statistical tests were used. Categorical variables were presented as frequencies and percentages. Continuous variables were presented as mean and standard deviation. The association between the risk factors and screen positivity for ASD were done using chi-square test and odds ratio with 95% confidence interval for categorical variables. Any significant difference in continuous variables was analyzed using independent *t*-test. A test was considered statistically significant if *P* value was <0.05. Multivariate logistic regression analysis with adjusted odds ratio was then performed to predict risk factors associated with screen positivity for ASD.

3. Results

Of the 350 children screened for the risk of developing autism spectrum disorders in our pediatric OPD, there were 222 (63.42%) male and 128 (36.57%) female children. Out of 350 children, 281 (80.28%) children were classified as low risk, 36 (10.28%) children as medium risk and 33 (9.42%) children as high risk for developing ASD. The mean age of children in different categories is shown in Table 1. A significantly advanced paternal age at birth of the child was seen in children belonging to screen positive group compared to that of screen negative group (31.79 ± 6.1 vs 29.83 ± 4.6 , *P* value

Table 1
Age distribution.

Variables	Mean \pm SD		Mean \pm SD	F value (df)	P value
	Males (n=222)	Females (n=128)			
Mean age of screened children	21.52 \pm 4.85 (17–25)	22.50 \pm 5.07 (17–27)	21.88 \pm 4.95 (17–25)	1.597 (2)	0.203
Mean age of children according to risk					
Low	21.66 \pm 4.8	22.73 \pm 5.2	22.06 \pm 5.0	1.520 (2)	0.219
Medium	20.78 \pm 4.6	21.15 \pm 4.9	22.92 \pm 4.7	1.66 (2)	0.197
High	21.22 \pm 5.1	21.80 \pm 4.3	21.39 \pm 4.8	0.050 (2)	0.951

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