CLINICAL STUDY OF AUTISM SPECTRUM DISORDERS AMONG TODDLERS IN THE AGE GROUP OF 16-30 MONTHS IN THE FIELD PRACTICE OF TUMKUR.

Paediatrics

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ABSTRACT

Introduction: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder with multiple causative factors and varied symptoms including impaired social communication, repetitive behaviour and restricted interests posing a great impact on the early childhood in the form of poor schooling and social interaction which later on continues to hamper adult productivity. The prevalence of ASD is nearly 1 % worldwide, with male being more commonly affected compared to females . The diagnosis of ASD is made from the criteria in the Diagnostic Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).The Modified Checklist for Autism in Toddlers Revised (MCHAT-R) is an ASD screening tool. There is lack of studies regarding screening of autism spectrum disorders in south India, especially in the rural parts. Therefore, this study would help in early recognition and improved support of affected families and would also create awareness in the community. **Methodology:** This was a cross-sectional study conducted in the field practice of Sri Siddhartha Medical College and Hospital, Tumkur. The sample size considered was 600 cases. The study included children aged between 16-30 months from in and around Tumkur and those with visual or hearing impairment, neurodegenerative disorder / presence of any neurological deficits were excluded. These children were assessed using MCHAT- R questionnaire. **Results**: 600 children from both urban and rural communities were assessed using MCHAT-R screening tool, out of which 6 screened positive. The mean age was 29.17 +/- 1.33 months and male to female ratio was 5:1. The prevalence was found to be 1%. **Conclusion**: Signs of ASD can occur very early and the diagnosis can be made as early as 12 months. Since Paediatrician is the first contact medical person to the child and can refer the child early to Psychiatrist or Paediatric Neurologist for further intervention, this study would help in early recognition and improved support of affected families and would also create awareness in the community.

KEYWORDS

Autism spectrum Disorder,DSM-5, MCHAT-R

INTRODUCTION

According to Diagnostic and Statistical Manual of Mental Disorders,5th edition(DSM 5),autism spectrum disorder(ASD) is a neurodevelopmental disorder with disturbances in the social communication and social interaction associated with repetitive behaviors and restriction in the range of interests[1]. The prevalence of ASD is changing recently along with male to female ratio.1 in every 36(2.8% 8-year old children has been identified with ASD according to 2020 estimates from CDC' s(Centers for Disease Control and Prevention(USA) Autism and Developmental Disabilities Monitoring (ADDM) Network.ASD is 3.8 times as prevalent male(4.3%) as among female (1.1%) [2]. A systemic review update - The global prevalence of autism states approximately 1/100 children are diagnosed with autism spectrum disorder around the world [3].A diagnosis of autism can be made as early as 18–24 months of age; it is around this age that characteristic symptoms can be distinguished from typical development and from other delays or other developmental conditions.The diagnosis of ASD is made from the criteria in the Diagnostic Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)[1]. The Modified Checklist for Autism in Toddlers Revised (MCHAT-R) is an ASD screening tool. It is simple and inexpensive to use. It is intended for use in children aged 16-30 months and has 91% sensitivity and 95.5% specificity [4].

Our study aimed to determine the prevalence of ASD among toddlers by using screening method-M CHAT-R ,to sensitize the public on the emerging trend of ASD and to provide data for public health professionals ,developing an action plan and policy planners to decentralization of health services in the community.

Materials and Methods.

Study settings and source of data: The study participants/ subjects consist of children aged 16 to 30 months and their caregivers visiting to OPD of Department of Paediatrics, Sri Siddhartha Medical College Hospital & Research Centre, camps, and Anganwadi in rural and urban areas of Tumkur.

Study design: Cross sectional study

Sample size:. The minimal sample required is 479. Assuming non-response and 10%, the total sample size is 600

Study period: 18 months.

Methods of collection of Data.

Children fulfilling the inclusion criteria are selected.Informed written consent is obtained from the parents and they are included in the study.Children between the age 16 to 30 months attending Paediatric OPD, camps and Anganwadi in the urban and rural areas of Tumkur are assessed using MCHAT-R questionnaire.(Annexure)

The parents of the children who met the inclusion criteria are asked to fill the questionnaire containing 20 items which relies on parents' observation of their children. From each question, a point was given if the parent says "no", with scoring for item number 2, 5, and 12 were reversed. The points are then accumulated to a total score. The total score is further classified into: 0-2 (low risk of ASD), 3-7 (moderate risk of ASD), and 8-20 (high risk of ASD), respectively. Complete physical examination including neurological evaluation is done in the children who are screened positive They are further referred to psychiatrist and Paediatric neurologist for further evaluation and intervention.

Statistical Methods: The data are entered and analyzed using SPSS software 22.0.

Inclusion Criteria

Children in the age group of 16-30 months visiting the OPD, camps,

Anganwadi and schools of urban and rural areas of Tumkur.Those children for whom informed consent is obtained from parents.

Exclusion criteria
Children diagnosed with neurodegenerative disorder / presence of any neurological deficits. Children with visual or hearing impairment.

RESULTS:
This study included 600 toddlers, aged 16-30 months with a mean age of 22.24 +/- 4.11 months(Table 1). Out of 600 children included in the study,313(52.17%)toddlers were males and 287(47.83%) toddlers were females with male to female ratio was 1.1:1, with a near equal distribution.Out of 600 toddlers,351(58.5%) resided in urban areas and 249(41.5%) resided in rural areas. Out of 600 toddlers,six participants screened positive with MCHAT-R Screening Tool(Table-2).
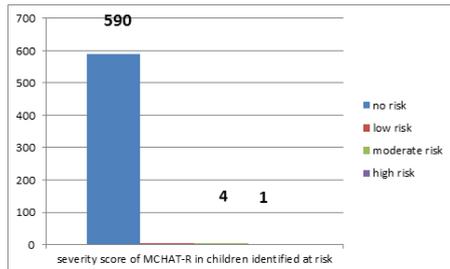
Table 1: Age Distribution

	AGE (MONTHS)
Mean	22.24
Std. Deviation	4.11
Minimum	16
Maximum	36
95% Confidence interval for mean	21.91 - 22.57

Table 2: Severity score of the Modified Checklist for Autism Spectrum Disorder in Toddlers-Revised in children identified at risk

MCHAT-R Scores	No. of toddlers
No risk	590
Low risk (0-2)	4
Moderate risk (3-7): screen positive	**4**
High risk (8-20): screen positive	**2**

Among the screen positive toddlers (6 cases), majority (66.67%) had moderate risk of developing Autism spectrum disorder and the remaining had a high risk of developing ASD. The bar diagram below depicts the same.

Figure 1: Bar diagram representing severity score of MCHAT-R among the toddlers identified at risk

The mean age among the screen positive toddlers was 29.17 ± 1.33(Table-3).The gender distribution among the six screen positive toddlers , showed that majority were males(5) in those with ASD with a male to female ratio of 5:1. The prevalence of ASD among male toddlers is 0.83%(n=5) and that in female toddlers is 0.17%(n=1), indicating higher prevalence of ASD in boys(Table-4).

Table 3: Mean age among the Screen positive Toddlers

	SCREENING	Frequency	Mean ± Std.
AGE (MONTHS)	NO	594	22.17 ± 4.07
	YES	6	29.17 ± 1.33

Table 4: Gender distribution among screen positive Toddlers

		SEX		
		M	F	Total
SCREENING POSITIVITY	YES	5	1	6
	NO	308	286	594
	Total	313	287	600

Table 5: Urban and Rural distribution among screen positive Toddlers

		SCREENING POSITIVITY		
		YES	NO	Total
URBAN/RURAL	Rural	3	246	249
	Urban	3	348	351
	Total	6	594	600

This table represents the distribution of screen positive and screen negative toddlers in urban and rural areas. There was equal distribution of screen positives between rural(50%) and urban(50%) areas. . There was no correlation of distribution in urban and rural with risk of ASD (**p value: 0.874**).(Table-5)

In our study the response rate with maximum items (questions) answered are more for four best discriminators of ASD as per MCHAT-R are item no 17,followed by 3,7,14 with percentage of 1.17 , 0.67 respectively.In our study only 1 female toddler found screen positive with MCHAT -R score 3 with response to the item no 2,8 and 14 .

Table 6:MCHAT-R best discriminators responses in screen positive Toddlers with percentage.

Item no	MCHAT-R item description	Male(N=5)		Female(N=1)		Total(%)
		YES	NO	YES	NO	
1	If you point at something across the room, does your child look at it?	0	2	0	0	2(0.33)
2	Have you ever wondered if your child might be deaf?	1	0	1	0	2(0.33)
3	Does your child play pretend or make-believe?	0	4	0	0	4(0.67)
6	Does your child point with one finger to ask for something or to get help?	0	2	0	0	2(0.33)
7	Does your child point with one finger to show you something interesting?	0	4	0	0	4(0.67)
8	Is your child interested in other children?	0	2	0	1	3(0.5)
9	Does your child show you things by bringing them to you or holding them up for you to see – not to get help, but just to share?	0	3	0	0	3(0.5)
10	Does your child respond when you call his or her name?	0	3	0	0	3(0.5)
11	When you smile at your child, does he or she smile back at you?	0	1	0	0	1(0.17)
14	Does your child look you in the eye when you are talking to him or her, playing with him or her, or dressing him or her?	0	3	0	1	4(0.67)
16	If you turn your head to look at something, does your child look around to see what you are looking at?	0	3	0	0	3(0.5)
17	Does your child try to get you to watch him or her?	0	6	0	1	7(1.17)
18	Does your child understand when you tell him or her to do something?	0	3	0	0	3(0.5)
19	If something new happens, does your child look at your face to see how you feel about it?	0	3	0	0	3(0.5)

DISCUSSION
The prevalence of ASD in toddlers of all ethnic groups is reported to be between 0.1% to 10%. In our study, 1% of toddlers in the study population of 600 have a positive screening test using MCHAT scores with 33.3% of them having high risk and 66.67% having moderate risk of developing ASD. This result was similar to that seen in a study by Pathak et al,2022 [5] and Metgud DC et al,2019 [6]. But the studies conducted by other authors show the higher prevalence of ASD. Prevalence of ASD in a study conducted by Ravi et al, Pondichery,India(2016)[7] ,Jaison Joseph et al, Rohtak(2021) [8], Ts J et al,kerala,India(2018) [9],were 9.42%,7.12% and5.5%,2.7% best seven(7) respectively and study conducted by Zhang Ying et al,China(2022) [10] was 4.1% .Other studies conducted by different authors were compared with present study.(Table-7)

The CDC also reveals that the prevalence rate of ASD ranges from 23.1/1000 to 44.9/1000, as stated in the DSM 5 in the year 2020.[2]

Table-7:Comparison of Prevalence of ASD between other studies.

Previous studies	Screening tool	Sample size	Study period	Prevalence rate (%)
Ravi et al,2016,Pondichery, India [7]	MCHAT-R	350	12 months	9.42
Ts J et al 2018, Kerala, India [9]	MCHAT-R and Best seven	6237	12 months	5.5(MCHAT-R) 2.7(Best seven)
Metgud DC et al 2019, Belgaum, Karnataka, India [6]	MCHAT-R	510	6 months	0.19
Jaison Joseph et al,2021,Rohtak, India[8]	MCHAT-R	548	12 months	7.12
Pathak A et al 2022, Ranchi, Jharkhand, India[5]	MCHAT-R	1010	12 months	1.08
Zhang Ying et al,China,2022[10]	MCHAT-R	11190	24 months	4.1
Present study	MCHAT-R	600	18 months	1

In the present study,the mean age was 22.24 +/- 4.11 months for whole sample and 29.17+/- 1.33 months for screen positive cases which is similar to Jaison et al(2021)[8] study .In the **present** study,the prevalence of ASD was more in boys (5) than girls (1)with a male to female ratio of 5:1. According to DSM- 5 ASD prevalence in gender distribution male and female ratio is 4:1.Similar prevalence was seen in other studies, we note that Metgud et al(2019)[6],Pathak A et al(2022)[5], Ravi et al(2016)[7]Jaison et al(2021)[8] and , Jaisoorya et al(2018)[9] had similar male distributions compared to our study. (Table-8)

Table 8:Comparison of mean age and male percentage with other studies

STUDY	MEAN AGE	MALE	PREVALENCE
Ravi [7]	21.39 ±4.8 months	63.42%	9.42%
Jaisoorya[9]	20.13 (±2.72) months	50.3%	5.5%
Metgud DC[6]	24.5 ±5.04 months	100%	0.19%
Jaison Joseph[8]	28.66 (6.68) months	52.7%	6.57%
Pathak A [5]	16-30 months	68.42%	1.08%
Present study	29.17 ±1.33	83.33	1%

Our study findings show that the prevalence of ASD among toddlers aged 16-30 months in Tumkur is 0.5% in both urban and rural areas.This is lower than the figures reported by other study,Hoang et al,northern Vietnam(2019) i.e 1.238% in urban and 0.580% in rural areas of northern Vietnam.[11]

Response to MCHAT-R

99% of the questions have answered with the proportionately high screen for the item/question numbers 17 followed by 3,7,14 with the percentage of 1.17 , 0.67 respectively.Where as in the other study Jaisoorya et al[9],proportionately high screen positive rate in certain questions (Q 12, 5, 17), may have been found with the percentage of 35.3,12,5.1 respectively.

In study done by Jaison et al[8],the response rate of the seven best discriminators of ASD as per M-CHAT-R was calculated with item no 3,7,8,9,2,10,1 and found that these items were significant for detecting the screen-positive cases.The association was statistically significant $(P \leq 0.0001)$[8]. Hence item no 3,7 and 17 response rate is more in our study similar to other studies like Jaison et al and Jaisoorya et al.[9]

CONCLUSION:

The prevalence of ASD on screening toddlers aged 16-30 months in the present study was 1%, which is consistent with findings of studies in India and abroad. .Signs of ASD can occur very early and the diagnosis can be made as early as 12 months. This study also aimed at determining the prevalence of autism spectrum disorders in urban and rural population of Tumkur, as there may be an increase in the prevalence of Autism Spectrum Disorders following the pandemic, due to the rising psychological stress in both parents and their toddlers.Hence routine screening of toddlers is necessary for early identification. Further study is required to get more comprehensive information on ASD with large sample. Early intervention gives best

opportunity to support the healthy development and lifespan of child.

Limitations of the Study

Prevalence rates would have been higher if we had a larger sample size as this is a single centric study.The follow up of 2 out of 4 moderate risk toddlers who scored between 3-8 were lost. The MCHAT-R is a screening tool but not the diagnostic tool for ASD, hence further DSM 5 Criteria should me applied for positive screened sample.

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