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Research Article

Application of Autism Spectrum Screening Instrument (M-CHAT) in Day Centers in the City of Iranduba-AM

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Abstract

Purpose: investigate through the application of M-Chat method, children with autism spectrum disorder who did not have an early diagnosis, in four daycares in the city of Iranduba/AM. **Methods:** A cross-sectional, quantitative study, performed through a questionnaire for teachers and parents of children on maternal 1 and 2. In an effort to measure behavioral criteria associated with the Autism Spectrum Disorder (ASD), a study was conducted. The method used for data collection was a modified version of the checklist for Autism in Toddlers, known as M-Chat. Specifically targeted were 116 children between ages 24 and 36 months who were at scholar age compatible with Maternal 1 and 2 respectively. Results yielded those 10 possible cases of ASD existed within this group; these individuals then underwent further evaluation by specialists at Psychosocial Care Center in Iranduba - AM called CAPS where 6 diagnoses of ASD were made: 5 females and only one male; results were contradictory to previous studies citing higher prevalence rates among males. **Conclusion:** While considered an efficient tool for research purposes according to our findings, it must be noted that accurate identification could not have been reached without the participation from attentive educators aided by observant parents whose eagerness contributed significantly towards promoting early detection amongst affected youngsters thus facilitating improved outcomes post-diagnosis intervention efforts.

Keywords: ASD; Autism; M-Chat

Introduction

Autism is defined as a complex developmental disorder, from a behavioral point of view, with different etiologies that manifests itself in varying degrees of severity [1-3]. Autism Spectrum Disorder (ASD) is characterized by poorly developed social skills and communication deficiencies associated with limited interests and restricted activities. Impairment in communication affects verbal and non-verbal skills [4-6].

It was first described in 1943, in the United States, by the Austrian physician Leo Kanner and later by Hans Asperger, in 1944 in Austria, who compared the symptoms of autism similarly to that described by Kanner [7-10].

According to the most recent Autistic Spectrum Disorder Handbook for Children in Canada 2018, Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that includes impairments in language, communication, skills, and social interactions combined with restricted behaviors and repetitive tasks, interests, or activities. Signs of ASD are typically detected in early childhood. Each person with ASD is unique and will have different symptoms, deficits and abilities [11].

It is noteworthy that the number of children with ASD has been increasing significantly, which has been attributed to the expansion of diagnostic criteria, greater awareness of the disorders and, to a lesser extent, the increase in disorders in the general population [12-14].

It is possible to suspect a child with autism from the first months of life, through the assessment of the child's neuropsychomotor development [15]. If some alterations are observed, such as absent or non-sustained gaze during breastfeeding, delay in acquiring the social smile, indifference when parents are absent, as well as when parents return, among other alterations, they may be early signs that indicate the need for a better assessment of neuropsychomotor development, focusing on stimulation, socialization and language of this child.

In this regard, it is essential that Pediatricians pay attention to the children's developmental milestones and investigate any sign of verbal delay, isolated behavior and stereotypes that show the first signs of ASD, in order to intervene in this reality [16,17]. It is worth mentioning that the signs of Autistic Spectrum Disorder 5-ASD become more noticeable in children from 18 months of age onwards [18,19]. Therefore, it is imperative that every child aged 18 months or older undergo screening, regardless of whether or not they have suspected ASD [20].

Diagnosing ASD requires a meticulous, comprehensive and multidisciplinary approach and the early identification of signs and symptoms of risk for its development is fundamental, since the sooner the treatment is started, the better the results in terms of cognitive development, language and social skills [21,22].

The M-CHAT method (Modified Checklist for Autism in Toddlers) has been pointed out and recommended by the Department of Pediatrics for Development and Behavior of the Brazilian Society, as an efficient instrument to assist pediatricians and health professionals who work with children in early childhood, to detect the first signs of Autistic Spectrum Disorder (ASD). This method was translated and validated into Portuguese respecting cross-cultural equivalence in 2008 [23]. There exists a lack of agreement within the realm of literature pertaining to method employed in translation with cross-cultural adaptation being among one feasible approach. In 2023, Revista Paulista de Pediatria published the article "Translation into Portuguese and validation of the Modified Checklist for Autism in Toddlers scale, Revised with Follow-Up for early screening of autism spectrum disorder" [24].

Methods

This is a cross-sectional, quantitative study, with application of a questionnaire, however, specifically to measure behavioral criteria compatible with autistic spectrum disorder.

The study used the data collected after the application of questionnaires carried out in day care centers in the city of Iranduba-AM, with similar characteristics of care, such as number of patients per age group and gender. The answers to the scale items take into account the observations of parents and teachers regarding the child's behavior, taking a few minutes to be completed, being of low cost and without generating discomfort to the patients.

The target population for the development of the research consisted of 116 children aged 24-36 months assisted in daycare centers in the city of Iranduba-AM. Despite being primarily designed for assessing children up to 24 months old, it was deemed essential to administer this tool on children as old as three years. This is because the city suffers from a dearth of both resources and expertise pertaining to Autism Spectrum Disorder (ASD), making it all the more crucial that we extend our scrutiny beyond these arbitrary age limits. Moreover, the absence of availability to well-constructed medical assistance, educational materials and guidance facilities can worsen the predicaments that people with autism spectrum disorder undergo.

The instrument applied was filled out by both professionals (teachers) and parents or guardians of the children in the daycare centers. They all signed and consented to the Free and Informed Consent Form (ICF), in which the research objectives were explained and the confidentiality of the information provided was guaranteed.

The application of questionnaires as a method to obtain data was used in every segment of the target population, since they are filled out by the interviewee. For the reading of the results, the M-CHAT score is considered suspect for ASD with results higher than 3 (failure in 3 items in total) or in 2 of the items considered critical (2,7,9,13,14,15), according to table 1.

| 1. No	2. **No**	3. No	4. No	5. No
6. No	7. **No**	8. No	9. **No**	10. No
11. Yes	12. No	13. **No**	14. **No**	15. **No**
16. No	17. No	18. Yes	19. No	20. Yes
21. No	22. Yes	23. No		
Source: Diana Robins, Deborah Fein and Marianne Barton. 1999.				

Table 1: M-CHAT Scale results indicator.

Upon the determination of possible suspects, these individuals were subsequently recommended to undergo a specialized assessment for plausible diagnostic affirmation through CAPS (Center for Psychosocial Care) situated in Iranduba-AM. This center is an esteemed multidisciplinary reference establishment that employs Neurologists, Psychiatrists, Speech Therapists and Psychologists who practice within the township of Iranduba-AM.

In order to safeguard ethical aspects, this research was submitted to the Research Ethics Committee - CEP-UEA, with the title "Application of an Autism Spectrum Screening Instrument (M-CHAT) in Day Care Centers in the City of Iranduba-AM", and approved under opinion CAAE: 06518818.9.0000.5016.

Results

In order to reveal the number of children with suspected Autistic Spectrum Disorder - ASD, without early diagnosis, in daycare centers in Iranduba-AM, teachers and guardians of 116 children in four municipal daycare centers in the city of Iranduba-AM were interviewed, as per representation of (Figure 1). It is noteworthy that the Nejmi Aziz day care center was the one with the highest number, 54%, that is, more than half of the children studied.
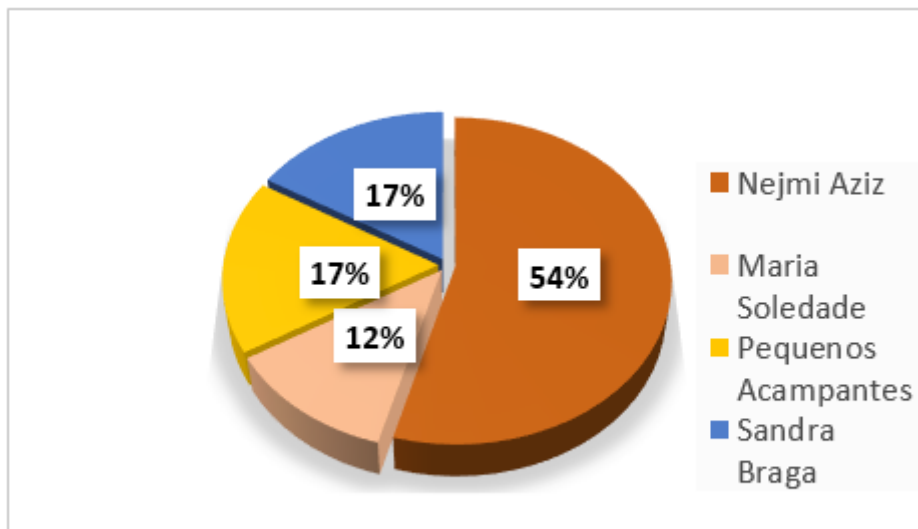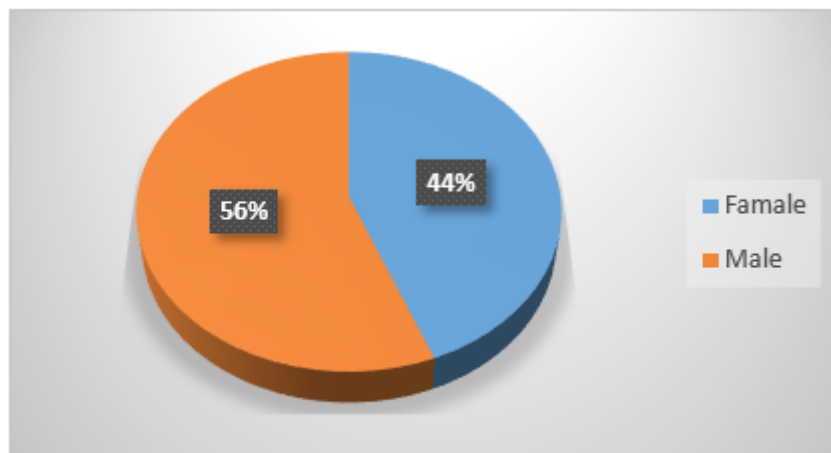
Source: The authors, 2019.

Figure 1: Total Children studied by Nursery.

Of the total number of children studied, 56% are male and 46% are female (Figure 2). It was considered important to identify the number of boys and girls in order to reveal which gender has a higher incidence of ASD.

Through (Figure 3) it can be seen that 79% of the studied children are in the 36-month age group. Research shows that ASD is most often not diagnosed until after the average age of five. Unfortunately, at this stage, children with autism have already been exposed to various problems of social interaction, repetitive language and behavior, among others [23].

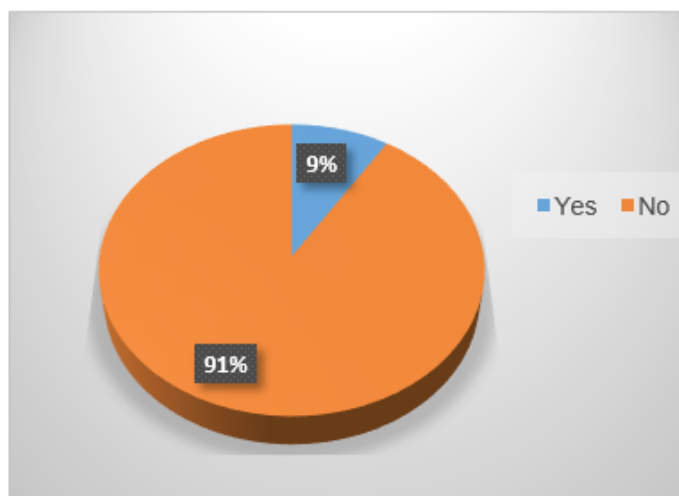Source: The authors, 2019.

Figure 2: Total Children studied by sex.
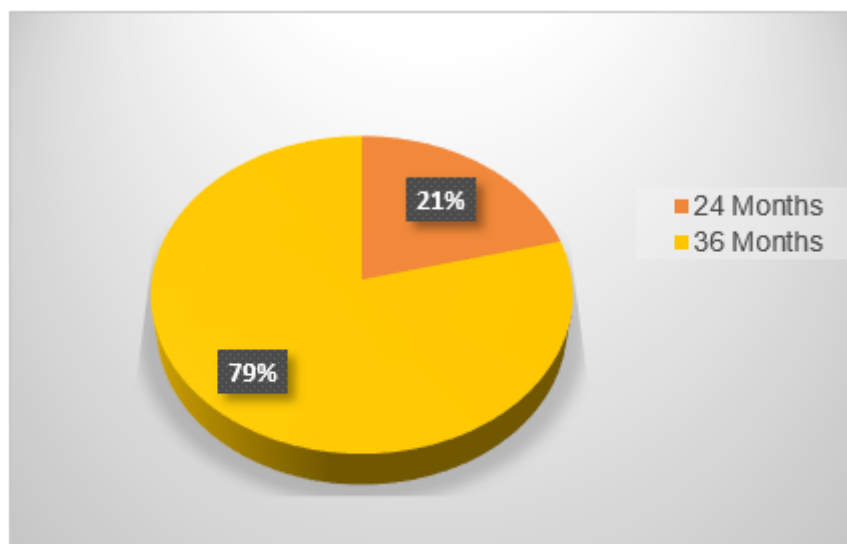
Source: The authors, 2019.

Figure 3: Children's age group.

Amongst all the children examined, 56% constitute male members while 46% make up females (Figure 2). Discerning the count of male and female progeny holds great significance in disclosing which gender is more susceptible to ASD. Therefore, it becomes imperative that children are diagnosed after 18 months since this marks a pivotal phase where symptoms begin manifesting themselves prominently, as mentioned earlier. In addition, several studies reinforce that early intervention increases the chances of improvements in the clinical picture of autism, providing significant gains in the child's development process.

Of the total target population studied, that is, 116 children, it was observed that 91% did not show signs of the Autistic Spectrum. On the other hand, only 9%, which is equivalent to 10 children, had a positive score for suspected ASD in the M-CHAT.
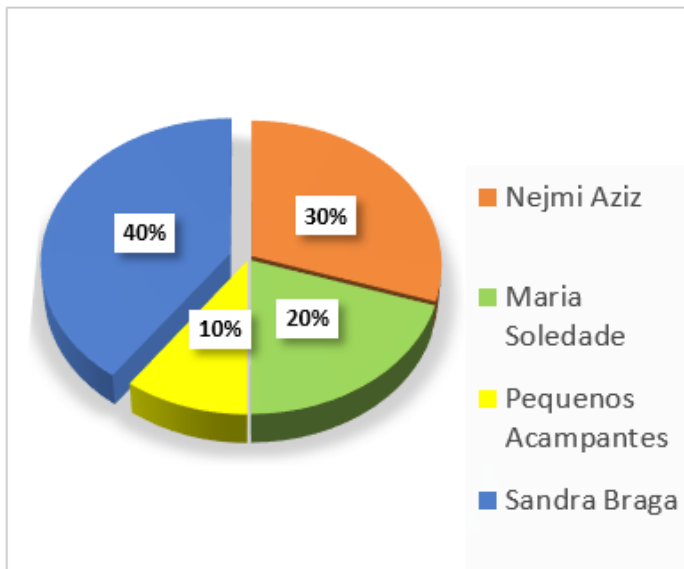

Source: The authors, 2019.

Figure 4: Suspected ASD.

Creche Sandra Braga, although it was not the one with the highest number of children studied, in the end it was the most prevalent in suspected cases of ASD with 40% of this total (Figure 5). Within the group of children exhibiting suspected ASD, there was an exact division among sexes with equal percentages consisting of males and females at 50% each (as can be observed in Figure 6).

According to the World Health Organization-WHO, it is estimated that autism affects one in every 100 children in the world [24]. The UN agency, in turn, asserts that several scientific studies suggest the existence of many factors that can make a child more prone to autism, including environmental and genetic issues [25].

Source: The authors, 2019.

Figure 5: Total number of children studied with suspected ASD per day care center.
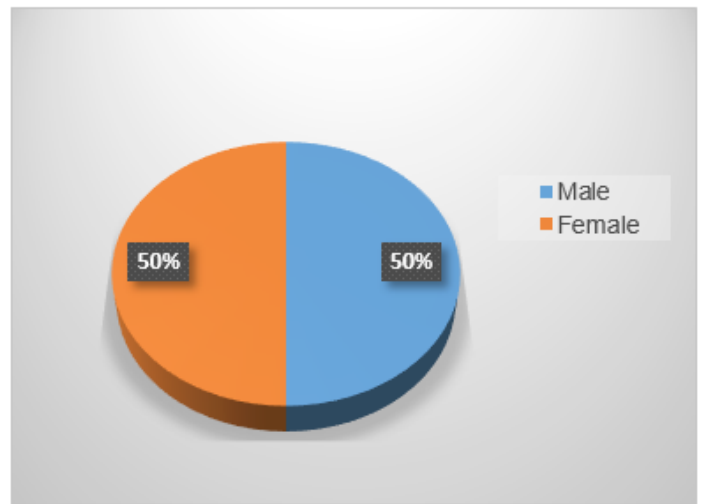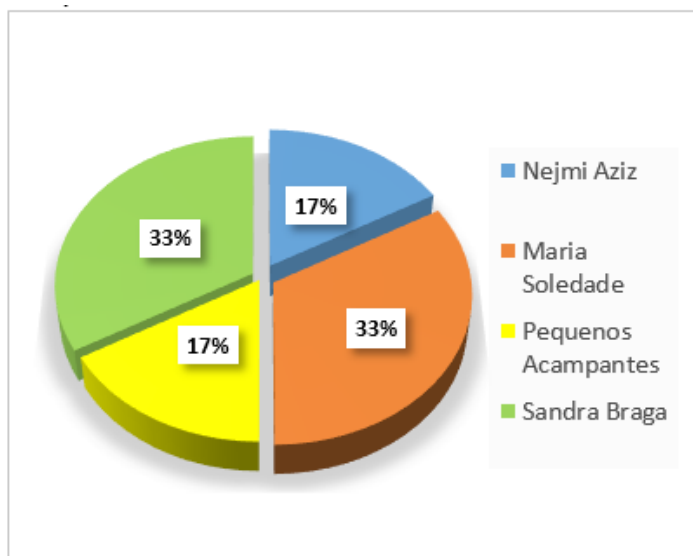

Source: The authors, 2019.

Figure 6: Total number of children suspected of ASD by sex.

After revealing suspicions of ASD, the 10 children were referred to the CAPS (Psychosocial Care Center) in the Municipality of Iranduba-AM, where they were evaluated by a multidisciplinary team that confirmed only 6 diagnoses of ASD.

Among the confirmed cases, the following distribution was obtained, as shown (Figure 7): Creche Sandra Braga - 02 (40%); Small Campers Nursery - 01 (10%); Maria Soledade Nursery - 02 (20%); Nejmi Aziz Nursery - 01 (30%). Once again, the Sandra Braca Day Care Center had the highest prevalence of ASD cases.

Also, relevant data refers to the percentage (90%) of female children, and only 01 male (10%) (Figure 8). The prevalence of 5 girls for 1 boy stands out, as opposed to the literature that reveals an incidence four times higher in boys than in girls [26].

In this work, no difficulties were reported regarding the application and completion of this instrument. Parents were advised from the outset that even if they scored positively after analyzing the answers to the questionnaire, the definitive diagnosis would only be concluded after a specialized assessment by the CAPS Team. As a result, the end product may suggest the existence of an array of developmental disorders. By extension, this could imply that manifold and diverse afflictions have affected growth and progress in different ways at various stages over time. Consequently, it is imperative to conduct thorough assessments to inform intervention strategies geared towards mitigating these conditions for better outcomes both presently and in future scenarios. An example would be an impairment in language acquisition proficiency.

A higher number of suspected children was obtained at Creche Sandra Braga, consequently resulting in a higher incidence of suspected cases that were later confirmed by the CAPS multidisciplinary team. In relation to the pervasiveness of autism spectrum disorder in investigations conducted and referenced within this present study, it was noted that an escalation in diagnosed instances has come into view.

Source: The authors, 2019.

Figure 7: Total Children confirmed with ASD.

Due to the improvement in the study of the multiple forms of ASD manifestations, awareness of health professionals for its recognition and development of new screening tools such as the M-CHAT, there was a significant increase in the number of diagnosed cases, including milder spectra and in earlier age.

The CDC (Centers for Disease Control and Prevention) network in the United States has published a new report on the prevalence of Autism Spectrum Disorder (ASD) in children aged 8 years, the age at which it is considered that the percentage of diagnosed cases, in relation to in total, it is the highest ever. The report showed that 1 in 36 children had an ASD diagnosis in 2020, which compared with data from 2018 in which 1 in 44 children had this diagnosis. Data were collected in 11 states by the Autism and Developmental Disabilities Monitoring Network (ADDM). The US state of Wisconsin recorded the greatest relative change between 2018 and 2020, with a 49.5% increase in the overall prevalence of ASD [29].

Source: The authors, 2019.

Figure 8: Total Children by Sex Confirmed with ASD.

Discussion

According to the Brazilian Society of Pediatrics, in an April/2017 publication, the M-CHAT is now available in partnership with the Autismo e Realidade ONLINE website, as an early screening method for Autism/Autism Spectrum Disorder, easily applicable to parents and/or caregivers by trained health professionals.

The analysis of cases diagnosed in the target population of our study revealed a prevalence of 5.17 cases per 100 children. The cause for this outcome, as well as the potential tangible augmentation in global occurrence, remains unidentified. This result also suggests that more comprehensive population studies in our region could be useful in confirming these numbers. Comparisons of our prevalence with that of other communities around the world still present restrictions, since there are few data from population studies on the identification of ASD in preschool children.

Final Considerations

In view of the study carried out and the data collected in this research, through the application of the M-CHAT questionnaires, a significant number of children with suspected Autistic Spectrum Disorder - ASD were found, who later had their diagnosis confirmed by the CAPS team of specialists from Iranduba-AM.

The data obtained showed that teachers, parents and guardians were able to point out in the questionnaire the difficulties in the development of children (with up to 36 months of life), a fact that favored the submission of these children to a more accurate diagnosis. The highest number of children with ASD at Creche Sandra Braga was highlighted, with a prevalence of females, in contrast to the literature that states a higher incidence for males, that is, four boys for every girl with ASD in the world.

It is considered that the M-CHAT method represented an efficient tool for the purpose for which this research was proposed, allowing the achievement of the proposed objective, which consisted of identifying cases of children with ASD without early diagnosis. It is noteworthy that the increase in autism diagnoses and early intervention in the treatment of children with ASD make it possible to advance in studies and research that provide a greater understanding of this reality. The challenge, therefore, remains to intensify the screening practice to detect other cases with ASD at an early stage, or even in the search for new ways of conceiving the diagnosis.

References

1. Cekici H, Sanlier N (2019) Current nutritional approaches in managing autism spectrum disorder: A review. Nutr Neurosci 22: 145-155.

2. Thurm A, Farmer C, Salzman E, Lord C, Bishop S (2019) State of the Field: Differentiating Intellectual Disability from Autism Spectrum Disorder. Front Psychiatry 10: 526.

3. Simeoli R, Milano N, Rega A, Marocco D. Using Technology to Identify Children With Autism Through Motor Abnormalities. Front Psychol 12: 635696.

4. Aizaki K, Walton C, Lewis C (2023) Understanding the Impact of Restricted Interests on the Social Interactions of Adults with Autism Spectrum Disorder. Multimodal Approaches to Healthc Commun Res Vis Interact Resilient Healthc UK Japan.

5. Gal E, Yirmiya N (2021) Introduction: Repetitive and Restricted Behaviors and Interests in Autism Spectrum Disorders. p. 1-11.

6. Suthar N, Jain S, Nebhinani N, Singhai K (2020) Autism spectrum disorder and its differential diagnosis: A nosological update. Indian Assoc Child Adolesc Ment Health 16: 86-101.

7. Vicedo M, Ilerbaig J (2021) Autism in Baltimore, 1938-1943. J Autism Dev Disord 51: 1157-1172.

8. Jackman A, Zwaigenbaum L (2023) The History of Autism Spectrum Disorder. In: Neurodevelopmental Pediatrics. Cham: Springer International Publishing. Pp: 215-226.

9. Simmonds C (2019) GE Sukhareva's place in the history of autism research: Context, reception, translation.

10. Macoun SJ, Bedir B, Sheehan J (2022) Autism across the Ages: An Abbreviated History. In: Handbook of Autism and Pervasive Developmental Disorder pp 3-28.

11. Lord C, Elsabbagh M, Baird G, Veenstra-Vanderweele J (2018) Autism spectrum disorder. Lancet 392: 508-520.

12. Estrin GL, Milner V, Spain D, Happé F, Colvert E (2021) Barriers to Autism Spectrum Disorder Diagnosis for Young Women and Girls: a Systematic Review. Rev J Autism Dev Disord 8: 454-470.

13. Cardinal DN, Griffiths AJ, Maupin ZD, Fraumeni McBride J (2021) An investigation of increased rates of autism in U.S. public schools. Psychol Sch 58: 124-140.

14. Baranova J, Dragunas G, Botellho MCS, Ayub ALP, Bueno-Alves R, et al. (2021) Autism Spectrum Disorder: Signaling Pathways and Prospective Therapeutic Targets. Cell Mol Neurobiol 41: 619-649.

15. O'Shea TM, Allred EN, Dammann O, Hirtz D, Kuban KCK, et al. (2009) The ELGAN study of the brain and related disorders in extremely low gestational age newborns. Early Hum Dev 85: 719-725.

16. (2023) Autism Spectrum Disorder. American Speech-Language-Hearing Association.

17. American Academy of Pediatrics (2023) 3 Early Signs of Autism Spectrum Disorder (ASD). Healthy Children.Org.

18. Navarro-Pardo E, López-Ramón MF, Alonso-Esteban Y, Alcantud-Marín F (2021) Diagnostic Tools for Autism Spectrum Disorders by Gender: Analysis of Current Status and Future Lines. Children 8: 262.

19. Anagnostopoulou P, Alexandropoulou V, Lorentzou G, Lykothanasi A, Ntaountaki P, et al. (2020) Artificial intelligence in autism assessment. Int J Emerg Technol Learn 15: 95-107.

20. Thabtah F, Peebles D (2019) Early Autism Screening: A Comprehensive Review. Int J Environ Res Public Health 16: 3502.

21. Singhi P, Malhi P (2023) Early Diagnosis of Autism Spectrum Disorder: What the Pediatricians Should Know. Indian J Pediatr 90: 364-368.

22. Fuentes J, Hervás A, Howlin P (2021) ESCAP practice guidance for autism: a summary of evidence-based recommendations for diagnosis and treatment. Eur Child Adolesc Psychiatry 30: 961-984.

23. Losapio MF, Pondé MP. Tradução para o português da escala M-CHAT para rastreamento precoce de autismo. Rev Psiquiatr do Rio Gd do Sul 30: 221-229.

24. Losapio MF, Siquara GM, Lampreia C, Lázaro CP, Pondé M (2023) Translation into Brazilian Portuguese and validation of the M-CHAT-R/F scale for early screening of autism spectrum disorder. Rev Paul Pediatr 41.

25. Nowell SW, Watson LR, Boyd B, Klinger LG (2019) Efficacy Study of a Social Communication and Self-Regulation Intervention for School-Age Children with Autism Spectrum Disorder: A Randomized Controlled Trial. Lang Speech Hear Serv Sch 50: 416-433.

26. World Health Organization (2023) Autism.

27. Rylaarsdam L, Guemez-Gamboa A (2019) Genetic Causes and Modifiers of Autism Spectrum Disorder. Front Cell Neurosci 13: 385.

28. Kuter B, Uzel I (2021) Evaluation of oral health status and oral disorders of children with autism spectrum disorders by gender. Arch Pediatr28: 33-38.

29. Maenner MJ, Warren Z, Williams AR, Amoakohene E, Bakian AV, et al. (2023) Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years - Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2020. MMWR Surveill Summ 72: 1-14.