CASE REPORT

Risk Prediction using M-CHAT and Treatment with Speech and Occupational Therapy in Autism Spectrum Disorder

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ABSTRACT

Introduction: Autism spectrum disorder (ASD) has been increasingly recognized, with the prevalence of ASD in 2017 in Indonesia was 0.36%. ASD is faced with challenges in detection and intervention, considering its new awareness initiated around 10-15 years ago.

Case Description: A 30-months-old male had a chief complaint of unable to form words. No other growth nor other pre-existing disorders were found. Denver II test found delay in speech and personal-social developments. M-CHAT found that the patient had a high risk of ASD. Behavioral Observational Therapy found no hearing disorders. The patient then received speech and occupational therapy, showing improvements in condition after 1 year of therapy.

Discussion: Diagnosing ASD must undergo several steps, which were development assessment, hearing assessment, ASD screening, and ASD diagnostic evaluation. Endorsed tools by the Ministry of Health of Indonesia for development screening were KPSP and Denver II test. Hearing assessment could be screened through TDD but should not undermine the need for equal distribution of hearing assessment tools, such as OAE and BERA. ASD screening was mainly done using M-CHAT, since other tools were less sensitive and specific. Diagnostic evaluation would be done according to DSM-5 criteria, which was more specific yet less sensitive than its predecessor. Other tests for development and ASD screening must be studied to provide alternatives. Regarding treatment, more studies were needed to provide deeper evidence for current therapies.

Conclusion: Further research in the screening, diagnosis, and treatment of ASD is needed.

Keywords: Autism, Case Report, Diagnosis, Screening, Treatment

ABSTRAK

Latar Belakang: Gejala Autism Spectrum Disorder (ASD) semakin banyak diketahui, dengan prevalensi ASD pada tahun 2017 di Indonesia sebesar 0,36%. ASD menghadapi tantangan dalam deteksi dan intervensi, mengingat kesadarannya baru dimulai sekitar 10-15 tahun yang lalu.

Deskripsi Kasus: Seorang anak laki-laki berusia 30 bulan memiliki keluhan utama tidak dapat mengucapkan kata-kata. Tidak ditemukan gangguan pertumbuhan lain atau gangguan lainnya yang sudah ada sebelumnya. Tes Denver II menemukan keterlambatan dalam perkembangan bicara dan personal-sosial. M-CHAT menemukan bahwa pasien memiliki risiko tinggi ASD. Behavioural Observational Therapy tidak menemukan gangguan pendengaran. Pasien kemudian menerima terapi wicara dan okupasi yang menunjukkan perbaikan kondisi setelah 1 tahun terapi.

Diskusi: Diagnosis ASD harus menempuh beberapa prosedur, yaitu penilaian perkembangan, penilaian pendengaran, skrining ASD, dan evaluasi diagnostik ASD. Alat yang didukung oleh Kementerian Kesehatan Indonesia untuk skrining perkembangan adalah KPSP dan tes Denver II. Penilaian pendengaran dapat diskrining melalui TDD, tetapi tidak boleh mengabaikan kebutuhan akan pemerataan alat penilaian pendengaran, seperti OAE dan BERA. Skrining ASD seringkali dilakukan menggunakan M-CHAT, karena alat lainnya kurang sensitif dan spesifik. Evaluasi diagnostik dilakukan berdasarkan kriteria DSM-5 yang lebih spesifik tetapi kurang sensitif dibandingkan kriteria pendahulunya. Tes lain untuk skrining perkembangan dan ASD harus dipelajari untuk memberikan alternatif. Mengenai terapi, penelitian lebih lanjut masih diperlukan untuk memberikan bukti yang mendalam untuk terapi saat ini.

Kesimpulan: Penelitian lebih lanjut dalam skrining, diagnosis, dan pengobatan ASD masih diperlukan.

Kata kunci: Autisme, Laporan Kasus, Diagnosis, Skrining, Pengobatan

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INTRODUCTION

Cases of autism spectrum disorder (ASD) have been increasingly recognized, with a global prevalence of 65/10,000 in 2022 and rising trends at a country level and specific subgroups, such as the United States, South Korea, and Taiwan.[1] In Indonesia, the prevalence of ASD in 2017 was 0.36%, with 24.8% patients comprising of children from age 0 to 14.[2] Being one of the most complex psychological problem to occur, ASD requires comprehensive approach in order to enact early detection and treatment. However, ASD is faced with challenges in detection and intervention attempts, especially considering how ASD is not fully comprehended yet by Indonesian due to its new awareness initiated around 10-15 years ago.

Regardless of efforts made by the Indonesian government in improving access for ASD services, those facilities are

not evenly spread across the country.[3] To help ensure quality care accessibility for ASD patients, health workers must understand the steps taken in diagnosing and treating them. This knowledge should reach not only hospitals, but also primary healthcare facilities that are more preferable for patients in remote areas. With that in mind, the purpose of this report is to understand the current steps in diagnosing and treating ASD. This report would be significant in terms of being a source of updated knowledge regarding ASD as well as pushing lesser-known means of diagnosing and treating ASD to be developed in Indonesia. To achieve that, the research question of this report was what the novel tools and procedures are in diagnosing and treating ASD. Hence, this report would present a case of a 30-months-old male child diagnosed with ASD in Dr. Soetrasno Hospital, Rembang and discuss specifically about screening and diagnosing of children with ASD.

CASE DESCRIPTION

A 30-months-old male child came with his parents to a pediatrician in dr. R. Soetrasno General Regional Hospital, Rembang, with a chief complaint of unable to form words, whether on his own or when spoken to. Speech capability of patient was only through repeated, incomprehensible sounds and shouting. This complaint was observed not only by the parents of the patient, but also by the teacher of the kindergarten he went to. When called by his parents, the patient often did not turn his head towards them and did not gave any eye contact. When his parents or teachers tried to establish eye contact, the patient tended to not respond. The patient utilized pointing and pulling the hands of the parents to communicate.

According to the parents, the patient was also observed to rarely play with other children, whether around his home nor in kindergarten. The patient was also observed by his parents to have fixation towards watches and fans and usually would prefer to play with tomato replicas only. Patient was not able to sit still for a short period of time and repeatedly waved his hands. To help calm the patient, the parents often gave him gadget at a daily basis. Any similar complaints from family and relatives were denied. During pregnancy, no abnormalities were complained and the patient was delivered through spontaneous means with a midwife present. During birth, the weight of the baby was 3,200 grams. It was reported that the baby did not initially cry and was only able to after receiving resuscitation from health workers. Complaints of fever, seizures, breathing distress, jaundice, nor cyanosis were denied. The patient received timely mandatory vaccinations. Exclusive breastfeeding was received from 0 to 6 months old and the patient was introduced to soft food after 6 months old. Breastfeeding was continued until 24 months and after that, the patient was able to eat family food. Daily diet of patient consisted of fried chicken, eggs, and rice with a portion size of one bowl for three times a day. Patient also consumed 20 ml of Ultramilk UHT milk for twice a day. At the time of his first consultation, the patient had a weight of 15.4 kg, height of 92 cm, WAZ 1.13, HAZ -0.17, and WHZ 1.73. Head-to-toe examination found no other abnormalities.

The patient was then evaluated using Denver II test, where it was found that fine and rough motoric developments were in line with his age. However, speech and personal-social developments were delayed, with each being in line with the age of 15 and 18 months old, respectively. Modified Checklist for Autism in Toddlers (M-CHAT) was used afterwards to assess if there were any risk for autism spectrum disorder (ASD). M-CHAT produced a score of 15, as shown on figure 1, which indicated that there was a high risk for ASD in the patient. Hearing assessment was also conducted by an otolaryngologist through

Behavioral Observational Assessment using bell with a result of normal hearing abilities. From these examinations, the patient was diagnosed with speech delay and suspected autism spectrum disorder. The patient was subsequently referred to a physiatrist to receive further therapy.

The patient was programmed by the physiatrist to undergo speech and occupational therapy. The exercise given in speech therapy was receptive and expressive language exercise, while in occupational therapy was attention and concentration exercise, including obedience and eye contact training. After three months of therapy, there was an increase in attention, obedience, and instruction understanding, but eye contact was still minimal. The patient still had difficulties in sitting still for a short amount of time. Nine months after therapy, the patient showed improvement in speech, namely the ability to name pictures. Twelve months after therapy, the patient was re-evaluated with M-CHAT, which gave a result of 7, indicating that the exercised programmed managed to improve the condition of the patient. For upcoming treatment, the patient would be programmed to undergo behavioral therapy.

M-CHAT-R™

Mohon jawab pertanyaan berikut ini tentang anak anda. Pikirkan bagaimana perilaku anak anda biasanya. Jika pernah melihat anak anda melakukan tindakan itu beberapa kali, namun dia tidak selalu melakukannya, maka jawab tidak. Tolong lingkari **ya** atau **tidak** pada setiap pertanyaan. Terima Kasih.

1	Jika anda menunjuk sesuatu di ruangan, apakah anak anda melihatnya? (**Misalnya,** jika anda menunjuk hewan atau mainan, apakah anak anda melihat ke arah hewan atau mainan yang anda tunjuk?)	Ya	Tidak
2	Pernahkah anda berpikir bahwa anak anda tuli?	Ya	Tidak
3	Apakah anak anda pernah bermain pura-pura? (**Misalnya,** berpura-pura minum dari gelas kosong, berpura-pura berbicara menggunakan telepon, atau menyuapi boneka atau boneka binatang?)	Ya	Tidak
4	Apakah anak anda suka memanjat benda-benda? (**Misalnya,** *furniture*, alat-alat bermain, atau tangga)	Ya	Tidak
5	Apakah anak anda menggerakkan jari-jari tangannya dengan cara yang tidak biasa di dekat matanya? (**Misalnya,** apakah anak anda menggoyangkan jari dekat pada matanya?)	Ya	Tidak
6	Apakah anak anda pernah menunjuk dengan satu jari untuk meminta sesuatu atau untuk meminta tolong? (**Misalnya,** menunjuk makanan atau mainan yang jauh dari jangkauannya)	Ya	Tidak
7	Apakah anak anda pernah menunjuk dengan satu jari untuk menunjukkan sesuatu yang menarik pada anda? (**Misalnya,** menunjuk pada pesawat di langit atau truk besar di jalan)	Ya	Tidak
8	Apakah anak anda tertarik pada anak lain? (**Misalnya,** apakah anak anda memperhatikan anak lain, tersenyum pada mereka atau pergi ke arah mereka)	Ya	Tidak
9	Apakah anak anda pernah memperlihatkan suatu benda dengan membawa atau mengangkatnya kepada anda – tidak untuk minta tolong, hanya untuk berbagi? (**Misalnya,** memperlihatkan anda bunga, binatang atau truk mainan)	Ya	Tidak
10	Apakah anak anda memberikan respon jika namanya dipanggil? (**Misalnya,** apakah anak anda melihat, bicara atau bergumam, atau menghentikan apa yang sedang dilakukannya saat anda memanggil namanya)	Ya	Tidak
11	Saat anda tersenyum pada anak anda, apakah anak anda tersenyum balik?	Ya	Tidak
12	Apakah anak anda pernah marah saat mendengar suara bising sehari-hari? (**Misalnya,** apakah anak anda berteriak atau menangis saat mendengar suara bising seperti *vacuum cleaner* atau musik keras)	Ya	Tidak
13	Apakah anak anda bisa berjalan?	Ya	Tidak
14	Apakah anak anda menatap mata anda saat anda bicara padanya, bermain bersamanya, atau saat memakaikan pakaian?	Ya	Tidak
15	Apakah anak anda mencoba meniru apa yang anda lakukan? (**Misalnya,** melambaikan tangan, tepuk tangan atau meniru saat anda membuat suara lucu)	Ya	Tidak
16	Jika anda memutar kepala untuk melihat sesuatu, apakah anak anda melihat sekeliling untuk melihat apa yang anda lihat?	Ya	Tidak
17	Apakah anak anda mencoba utuk membuat anda melihat kepadanya? (**Misalnya,** apakah anak anda melihat anda untuk dipuji atau berkata "lihat" atau "lihat aku")	Ya	Tidak
18	Apakah anak anda mengerti saat anda memintanya melakukan sesuatu? (**Misalnya,** jika anda tidak menunjuk, apakah anak anda mengerti kalimat "letakkan buku itu di atas kursi" atau "ambilkan saya selimut")	Ya	Tidak
19	Jika sesuatu yang baru terjadi, apakah anak anda menatap wajah anda untuk melihat perasaan anda tentang hal tersebut? (**Misalnya,** jika anak anda mendengar bunyi aneh atau lucu, atau melihat mainan baru, akankah dia menatap wajah anda?)	Ya	Tidak
20	Apakah anak anda menyukai aktivitas yang bergerak? (**Misalnya,** diayun-ayun atau dihentak-hentakkan pada lutut anda)	Ya	Tidak

Skor Total 15

Figure 1. M-CHAT during ASD Screening

DISCUSSION

Development of children, encompassing rough motoric, fine motoric, speech and language, and personal-social, is a fundamental part of pediatric assessment and must be carefully conducted by physicians, more importantly in primary healthcare facilities where patients ideally admit themselves there first instead of directly to a hospital. This could be reflected from the availability of hospitals in Indonesia that is way less than primary healthcare facilities. According to 2023 Statistical Yearbook of Indonesia, there were 3,072 hospitals and 10,374 public health centers (pusat kesehatan masyarakat/puskesmas) in 2022.[4] With a number more than three times higher than the former, public health centers played a significant role in assessing children development through Growth and Development Stimulation, Detection, and Intervention (Stimulasi, Deteksi, dan Intervensi Dini Tumbuh Kembang/SDIDTK). Public health centers must conduct SDIDTK by facilitating health workers and supporting human resources in conducting SDIDTK, strengthening network of services to increase the reach of SDIDTK, and ensuring the sustainability of SDIDTK in each working area.[5,6]

In this case report, the patient was brought to a pediatrician after obtaining a referral from a local clinic. The reason for admission was due to the teacher observing the patient to not be able to speak, hence the suggestion to the parents for the patient to undergo therapy. From this reason alone, it could be observed that parental and environmental knowledge regarding development deterrence were important in early detection of disorders in children. However, specifically for ASD itself, 77% of teachers did not understand the identification of children with ASD and 83% were unable to conduct it.[7] This condition became rather critical when considering that there was an estimated of 5-10% of children in Indonesia with developmental hinderance. Approximately 16% of 5-year-old children suffered from developmental disorder, in which speech disorders ranked first (13.8%), followed by fine motoric disorder (12.2%).[8]

These numbers showed that there was a higher burden in primary healthcare facilities, especially with general practitioners in those facilities, to detect developmental problems when taking into account the amount of primary healthcare facilities compared to hospitals available.

To help detect developmental disorders, various tools were available for physicians to use in a clinical setting. Tools that were developed in western countries were Bayley Scales of Infant Development (BSID), British Ability Scales (BAS), Denver Developmental Materials II, Stanford Binet Intelligence Scale, Ages and Stages Questionnaire, and Vineland Adaptative Behavior Scales II. Denver Developmental Materials II, more commonly known as Denver II, was frequently used by Indonesian clinicians, as recommended by the Indonesian Ministry of Health.[9] Nevertheless, the main problem that could arise from using these western tools was reduced performance because of sociocultural differences. For example, BSID-II scale was noted to experience differences in performance due to cross-cultural reasons when compared to infants in England, Mexico, Brazil, and Taiwan. Moreover, Denver Test was found to have high specificity (>91%) but inconstant sensitivity when weighing in education and income factors, with lower sensitivity in mothers with less years of education and lower income group.[10] Thorough studies regarding cross-cultural factors, its relations with development assessment tools, and strategies to improve any reduced performance in Indonesia were very limited and would still be needed in the future.

Development Pre-Screening Questionnaire (Kuesioner Pra-Skrining Perkembangan/KPSP) could be an alternative screening tool to be used. It was made in Indonesia and also endorsed by the Ministry of Health of Indonesia. This questionnaire was fairly easier to conduct rather than Denver II, where questionnaires were delivered originally using Indonesian language, compiled according to specific ages with its own milestones, and scored based on yes-or-no answers. Agreement levels between these tools were found to be relatively high, which could be explained because of both deriving from the same source, namely Prescreening Developmental Questionnaire (PDQ).[9,11,12]

Because of those advantages, KPSP was more appropriately used in primary healthcare facilities rather than Denver II. In SDIDTK Guidelines, it was explained that if there was doubtful delay in development, caregivers must explain to parents that the child must be stimulated more frequently and stimulation intervention must be taught by caregivers to parents, with an evaluation scheduled for two weeks after consultation. If there was possible delay in development, the patient must be referred to a hospital.[13] The existence of this management algorithm would help the dissemination of fast and adequate developmental management, thus preventing hospital overcrowding.

The patient in the case provided was assessed using Denver II test with 15 months and 12 months delay on speech and personal-social development, respectively. Denver II test became an appropriate test of choice because a pediatrician in a referral hospital was the one conducting the assessment. Since the test found delay in non-motoric developments and considering that the patient came with a chief complaint of unable to speak, hearing and emotional assessments were conducted. SDIDTK Guidelines outlined that for children aged 24 months or more, hearing assessment could be conducted through Hearing Power Test (Tes Daya Dengar/TDD) in which the patient could be suspected for hearing problems when failure in at least one set of command according to the test instrument.[13] Another option for screening would be behavioral response to sounds that were introduced out of direct vision of the patient.

This method was typically used in children with significant and irreversible language delay and where other sophisticated instruments were not available to use. In higher-type hospitals equipped with sophisticated instruments mentioned before, tests such as otoacoustic emissions (OAE) or brainstem evoked responds audiometry (BERA) could be used and were more thorough in understanding the hearing capabilities of the patient.[14]

In this patient, since OAE nor BERA were not available for use, the pediatrician in charge used behavioral response test with bells as a source of sound. The result of this test was that the child did not suffer from hearing disability. As stated in SDIDTK Guidelines, when any emotional problems were found in a child, the child would be entitled to three types of emotional disorders early detection assessments, which were Emotional Behavior Disorder Questionnaire (Kuesioner Masalah Perilaku Emosional/KMPE), Modified Checklist for Autism in Toddlers (M-CHAT), and Attention Deficit and Hyperactivity Disorders (ADHD) early detection form. However, taking into account the age of the patient in this case, the only appropriate assessment to be held towards the patient is M-CHAT, where the other two could only be conducted in children aged 36 months or more.[13] Other considerations for using M-CHAT could be from early symptoms of ASD that was found in children that were considered as red flags, as shown in table 1. As obtained from anamnesis conducted to the parents of the patient, the patient

avoided eye contact, had delayed speech and language skills, had obsessive interests towards specific objects, and made repetitive movements with hands, which would be considered eligible for ASD screening.[15]

According to SDIDTK Guidelines, M-CHAT could be used in children aged 18 to 36 months.[13] However, based upon 2020 ASD Guidelines by American Academy of Pediatrics (AAP), M-CHAT was appropriate for use in children in the age range of 16 and 30 months. The current version, known as M-CHAT-R/F (M-CHAT, Revised with Follow-up) had 20 questions that could be conducted in five to ten minutes. M-CHAT result could assess the risk for ASD in children; score of ≥8 meant that the child had a high risk of ASD, score of 3-7 meant that the child had a medium risk of ASD and should undergo follow-up questions to determine further the risk of ASD; while score of ≤2 meant that there was a low risk of ASD. Sensitivity for M-CHAT was 91%, while specificity for low-risk 18- and 24-months old children with follow-up questionnaire and interview was 95%.

Besides M-CHAT, Social Communication Questionnaire (SCQ) and Screening Tool for Autism in Toddlers and Young Children (STAT) could be used as an alternative in ASD screening. SCQ was appropriate for use in patients aged ≥4 years old and could be conducted in five to ten minutes through 40 items of assessment, but it has a moderate sensitivity and specificity (85% and 75%). It was reported that SCQ could identify symptoms that overlap with other conditions, for example ADHD. Sensitivity of SCQ could be increased when age cut-off was made into younger than 5 years old and 5-7 years old, yet it was reported that specificity for younger children was poor. STAT itself could be used for children with an age of 24-35 months old, in which it had a sensitivity of 83% and specificity of 86%. STAT usage for the age of <24 months old was explored with a sensitivity of 95% and specificity of 73%, with screening properties that could be improved when the age was above 14 months old. Nevertheless, even with only 12 items of assessment, recommended time of administration for STAT was 20-30 minutes, a considerably longer duration than the other two.[15] Further research to understand whether there were similar sensitivity and specificity in Indonesian patients or not and to outline cross-cultural impact towards reliability could help Indonesian clinicians in choosing the best tool and adjusting it for local use. Regardless of that, a more important thing to understand is that definitive diagnosis would not be necessary as a requirement for constituting early intervention towards patients with documented delays and early treatment of children younger than 36 months showed positive outcomes.

After a child was found to be at risk for ASD, the next step would be diagnostic evaluation. This step would require a consultation with a specialist, ranging from pediatricians, neurologists, psychologists, to psychiatrists. Even though evaluation could be carried by a variety of specialists, diagnosis must follow Diagnosis and Statistical Manual of Mental Disorders 5 (DSM-5) criteria of ASD, as stated in table 2. In order for a child to be diagnosed with ASD, all three criteria in domain A and at least two out of four criteria in domain B must be fulfilled.[15]

DSM-5 was an improvement of diagnostic criteria than the previous DSM-IV, where the new criteria had more stringent requirements in hopes to exclude very young children and those without intellectual disability. On one hand, these changes did improve specificity by 14% than DSM-IV, with agreement levels between those two diagnostic criteria to be substantially good (κ=0.78 (95% CI 0.73–0.82)). On the other hand, sensitivity

decreased by 4%, proving that simplification of subtypes into a singular condition defined by level of functional support required by the individual came with its consequences.[16] Nevertheless, DSM-5 criteria was found to have a high level of interrater reliability, which helped strengthen its consistency advantage.[17] Not only that, applicability of this criteria that already had empirical support from North American and UK samples in other parts of the world was found to be rather good. A study that compared data between Finnish and UK samples found that DSM-5 outperformed DSM-IV when used in autism disorder samples, but not in broader autism phenotype samples, signifying the effect of cross-cultural factors towards patient with mild autistic characteristics.[18] Studies that could replicate the research model into Indonesian context would be needed to help locate rooms for improvement in maintaining or even increasing sensitivity and specificity for Indonesian patients.

According to anamnesis conducted, inability in forming words and creating conversations, rareness in establishing eye contact, and difficulties in playing with other children correlated with the first, second, and third criteria of domain A. Moreover, the speech capability of patient that resembled echolalia and increased fixation towards specific objects were in line with the first and third criteria of domain B. From these analyses, the patient could be safely diagnosed with ASD. Nevertheless, this diagnosis could be supported by using other questionnaires, including SCQ, Social Responsiveness Scale (SRS), Behavior Assessment System for Children, Child Behavior Checklist, Diagnostic Interviewer for Social and Communication Disorders (DISCO), and Autism Diagnostic Inventory-Revised (ADI-R). Observations during consultation could also be conducted by clinicians using validated tools, such as Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) and Childhood Autism Rating Scale, Second Edition (CARS-2). All of these tools should be used accordingly, taking into account that no single questionnaire would be sufficient alone in diagnosing ASD and no single observation tool could be used for all clinical conditions.[15] Currently, no biomarkers were specific for ASD and etiologic evaluation could only be done through genetic testing, which caused diagnosing for ASD to be approached comprehensively from interviews and observations, especially in areas where such testing were less accessible.

Even in the United States, most parents (44.4%) would extremely unlikely to pay out of pocket for genetic testing for children with ASD. However, through stakeholder commitments, public and private insurances were able to cover genetic testing in part or full, a step that must be followed by Indonesian stakeholders.[19]

In terms of treatment, AAP Guidelines described two types of treatment that were backed up with evidences, which were comprehensive treatment model (CTM) and focused interventions. CTM could be approached using applied behavior analysis (ABA), developmental approaches, or naturalistic approaches, albeit its usage in Indonesia not as popular as focused interventions. Focused interventions could be in the form of speech and language interventions, motor therapies, and sensory therapies.[15] In this patient, based upon the symptoms manifested, speech and language therapies accompanied with sensory therapies were programmed. Behavioral therapy would be programmed as the next step in treatment. Speech and language therapies were the most commonly identified intervention in ASD children and one of the most preferred therapy techniques besides ABA and cognitive behavioral therapy (CBT).20 Speech therapies became very important due to articulation, phonological,

expressive language, and receptive language error that were commonly found in ASD children and had significant impacts towards speech capabilities. Speech-sensory tools that practiced oral stimulation were recommended in improving said capabilities.[21]

Sensory integration interventions, the other therapy programmed for this patient, were conducted due to its contribution in improving emotional-behavioral aspects, including hyperactivity, aggression, behavioral problems, anxiety, depression, somatization, attention, learning difficulties, atypicality, and withdrawal.[22] Sensory integration was found to be the most common type of occupational therapy provided, with Ayres Sensory Integration (ASI) intervention as the most requested plan of therapy. A meta-analysis provided evidence for its use in children with ASD aged 4-12 years old.[2,23] Taking into account the young age of this patient, a 2023 novel, non-randomized controlled trial study held in Indonesia found that 60 minutes of sensory integration occupational therapy with Ayres theory for twice a week across 12 weeks provided outcomes of improved communication domain in 2-4 years old ASD patients and socialization domain in 2 years old ASD patients.[24] Despite that, more evidence, especially in Indonesian patients, were still needed to give stronger base for therapies in ASD patients in order to craft better program schedule that could produce significant outcomes. New studies that could explore the usage of CTM in Indonesia would also help diversify treatment approaches and provide alternatives for patients.

Table 1. Red Flags of Autism Spectrum Disorder (ASD)[15]

	Symptom
By 12 months	Does not respond to name
By 14 months	Does not point at objects to show interest
By 18 months	Does not pretend play
General	Avoids eye contact and may want to be alone Has trouble understanding other people's feelings or talking about their own feelings Has delayed speech and language skills Repeats words or phrases over and over Gives unrelated answers to questions Gets upset by minor changes Has obsessive interests Makes repetitive movements like flapping hands, rocking, or spinning in circles Has unusual reactions to the way things sound, smell, taste, look, or feel

Table 2. DSM-5 Criteria for Autism Spectrum Disorder[15]

Domains	Criteria: Deficits	Examples
A. Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history; must have all 3 symptoms in this domain	1. Social-emotional reciprocity	Abnormal social approach and failure of normal back and-forth conversation; reduced sharing of interests, emotions, or affect; failure to initiate or respond to social interactions
	2. Nonverbal communicative behaviours used for social interaction	Poorly integrated verbal and nonverbal communication; abnormalities in eye contact and body language or deficits in understanding and use of gestures; total lack of facial expressions and nonverbal communication
	3. Developing, maintaining, and understanding relationships.	Difficulties adjusting behaviour to suit various social contexts; difficulties in sharing imaginative play or in making friends; absence of interest in peers
B. Restricted, repetitive patterns of behaviour, interests, or activities, as manifested by at least 2 of the following, currently or by history, must have 2 of the 4 symptoms	1. Stereotyped or repetitive motor movements, use of objects, or speech	Simple motor stereotypies, lining up toys or flipping objects, echolalia, idiosyncratic phrases
	2. Insistence on sameness, inflexible adherence to routines, or ritualized patterns or verbal nonverbal behaviour	Extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat food every day
	3. Highly restricted, fixated interests that are abnormal in intensity or focus	Strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interest
	4. Hyper- or hyporeactivity to sensory input or unusual interests in sensory aspects of the environment	Apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement

CONCLUSION

The process in diagnosing for ASD had to undergo several steps, which were development assessment, hearing assessment, ASD screening, and ASD diagnostic evaluation. Endorsed tools by the Ministry of Health of Indonesia for development screening were KPSP and Denver II test, but other tests were available

and should be studied for local use. Hearing assessment could be screened through TDD, yet this should not undermine the need for equal distribution of hearing assessment tools, such as OAE and BERA. ASD screening was mainly done using M-CHAT, since other tools were less sensitive and specific. Diagnostic evaluation would be done according to DSM-5 criteria, which was found to be more specific yet less sensitive than its predecessor. In terms of treatment, more studies were needed to provide deeper evidence for current therapy programs. This report would recommend studies to be conducted in Indonesia using a sufficient number of participants to explore other screening tests, risk prediction tests, and novel therapy programs in order to understand their effect towards local population and enable their usage in Indonesia.

PATIENT CONSENT

Consent had been given by the mother of the patient to publish the information included in this journal.

ACKNOWLEDGEMENTS

The authors would like to thank Dr. Soetrasno Hospital, Rembang, for allowing this research to be conducted.

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