RECOMMENDATIONS

Consensus Statement of the Indian Academy of Pediatrics on Evaluation and Management of Autism Spectrum Disorder

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PII: S097475591600056

ABSTRACT

Justification: Autism Spectrum Disorder (ASD) is a clinically heterogenous condition with a wide range of etiological factors and causing significant public health burden. ASD poses a serious developmental disadvantage to the child in the form of poor schooling, social function and adult productivity. Thus, framing evidence-based national guidelines is a pressing need.

Process*:* The meeting on formulation of national consensus guidelines on neurodevelopmental disorders was organized by Indian Academy of Paediatrics in Mumbai on 18th and 19th December 2015. The invited experts included Pediatricians, Developmental Pediatricians, Psychiatrists, Remedial Educators, Pediatric Neurologists and Clinical Psychologists. The participants framed guidelines after extensive discussions. Thereafter, a committee was established to review the points discussed in the meeting.

Objective*:* To provide consensus guidelines on evaluation and management of ASD in children in India.

Recommendations*:* Intervention should begin as early as possible. A definitive diagnosis is not necessary for commencing intervention. Intervention should target core features of autism i.e. deficits in social communication and interaction, and restricted repetitive patterns of behavior, activities and/ or interests. Intervention should be specific, evidence-based, structured and appropriate to the developmental needs of the child. Management of children should be provided through interdisciplinary teams, coordinated by the Pediatrician. Management of co-morbidities is critical to effectiveness of treatment. Pharmacotherapy may be offered to children when there is a specific target symptom or co-morbid condition.

Keywords: *Diagnosis, Guidelines, Multidisciplinary, Management, Outcome, Treatment*.

Framing guidelines for management of Autism Spectrum Disorder (ASD) in India is a pressing need due to the clinical complexity of the condition, high prevalence (1 in 65 children 2-9 years of age) [1], and the fact that ASD poses multiple limitations on schooling, adult capital and social inclusion.

The meeting on formulation of national consensus guidelines on neurodevelopmental disorders was organized by Indian Academy of Pediatrics in Mumbai, on 18th and 19th December, 2015. The invited experts included Pediatricians, Developmental Pediatricians, Psychiatrists, Pediatric Neurologists, Remedial Educators and Clinical Psychologists. The participants framed guidelines after extensive discussions and literature review. Thereafter, a committee was established to review the points discussed in the meeting.

Subsequent sections include the points of consensus on evaluation and management of ASD.

[RECOMMENDATIONS]

Clinical Evaluation

Empirically, it has been found that the earliest symptoms are absence of normal behavior (not presence of abnormal ones) *i.e.* a) absence of warm, joyful, reciprocating expressions or to-and fro babbling and jargoning and b) a 'very good' baby i.e. quiet and undemanding. Other key signs include parental concerns about inconsistent hearing or unusual responsiveness especially to name call; extremes of temperament and behavior ranging from marked irritability to alarming passivity; and regression of social skills and/ or speech.

Screening

All children should be screened by a standardized autism screening tool at 18 and 24 months of age [2].

A) If the child is above 18 months, then administer the ASD specific screening tool (discussed later)

B) If the child is below 18 months, then: a) evaluate social communication skills, b) commence parental education and c) reschedule next visit after 3 months (if child's age is less than 12 months) or after 1 month (if child's age is more than 12 months).

If concerns persist, then administer the ASD specific screening tool.

C) If screening results are positive or concerning then: a) continue parental education, b) refer the child for comprehensive ASD evaluation, c) initiate an early intervention program, d) evaluate hearing status and e) schedule next follow-up visit after a month

The Modified Checklist for Autism in Toddlers (M-CHAT) is a freely available and downloadable questionnaire (in multiple languages) to be completed by parents, which takes about 10 minutes to complete. It uses a simple scoring procedure based on passed/ failed items. If the child screens positive, a follow up interview is conducted including only those items on which the child failed in initial screening, thus decreasing the likelihood of false-positive results [3]. The Social Communication Questionnaire is another tool that is also available in many Indian languages. Studies have looked at the sensitivity and specificity of these tools and found that they are more accurate for pervasive developmental disorders including ASD with lower intellectual and adaptive functioning [4]. The Trivandrum Autism Behavior Checklist was developed at the Child Development Centre at Trivandrum, Kerala and it was observed that the results of evaluation were comparable to those obtained by administering the Childhood Autism Rating Scale (CARS) [5].

Clinical features

Symptoms of ASD must be present in the early developmental period, but they may not be apparent until later (i.e., when social demands exceed limited capacities). Hence, symptoms of ASD are most commonly recognized in the second year of life. However, symptoms in children with the least severe phenotypes of ASD may not be apparent to parents or teachers until four to six years of age or later. ICD-10 continues to require that symptoms be present before three years of age [6-9].

Children may present with delays in core developmental areas in first year of life or may develop typically and then plateau. Approximately two-thirds of patients with ASD present with lack of acquisition of communication skills during the first two years of life; and one-fourth to one-third of children achieve early language milestones, but have regression of language, communication and/or social skills between 15 and 24 months of age [8, 10-13]. Other reported features in literature are as varied as sensory and motor impairments, deficits in play and imitation skills and gastrointestinal symptoms [14-26].

Co-morbidities

Associated conditions with ASD could include intellectual or language impairment, known genetic conditions, catatonia, motor deficits (e.g., abnormal gait, clumsiness, toe-walking or hypotonia), macrocephaly, medical disorders (e.g., seizures, lead poisoning in children with pica); neurodevelopmental, behavioral and/ or mental health co-morbidities (e.g., hyperactivity, anxiety, depression, behavioral dysregulation), sleep problems (e.g., late onset, frequent waking, restlessness) that may affect daytime function, gastrointestinal, feeding, and nutrition problems (e.g., constipation, restricted diet), and delays in acquisition of self-help skills (e.g., toileting, dressing, hygiene).

[DIAGNOSIS]

Diagnosis of ASD is made as per the Diagnostic and Statistical Manual of Mental disorders - fifth edition [27], and independent checklists (discussed below) serve the purpose of eliciting the diagnostic features. The INCLEN diagnostic tool for ASD (INDT-ASD) has high content validity, internal consistency, criterion validity, convergent validity and 4-factor construct validity [28]. The Indian Scale for Assessment of Autism (ISAA) has a sensitivity of 93.3, specificity of 97.4 and positive and negative predictive values of 35.5 and 0.08, respectively; with good reliability but sub-optimal validity. The role of ISAA is relevant to identification and certification of 3–9 year old children at high risk for Autism, with the cut-off being an ISAA score of above 70 [29]. Another useful tool is the Childhood Autism Rating Scale (CARS): CARS score of ≥33 (sensitivity, 81.4%, specificity, 78.6%; Area under the curve 81%) has been advised for diagnostic use in the Indian population. CARS has good inter-rater reliability (0.74) and test-retest reliability (0.81) [30]. The Autism Diagnostic Observation Schedule (ADOS) has also been validated and translated into Hindi and Bengali [31]. In addition, the Autism Diagnostic Interview (ADI), with a sensitivity and specificity of 92% and 89% respectively, is a tool that can be used for diagnosis, albeit having significant cost and usage-time implications [32-35]. Table I summarizes the various operational aspects of ISAA, INCLEN diagnostic tool, ADI and ADOS.

All children with ASD should undergo a physical examination, and screening for hearing and vision [36]. Assessment of cognitive ability and adaptive skills is recommended for planning intervention, with respect to observed social-communication difficulties relative to overall development. The child's strengths and weaknesses need to be charted [37]. Measurements of receptive and expressive vocabulary (using a tool like Receptive-Expressive Emergent Language

Scale, REELS) and social-pragmatic skills (e.g. clinically or *via* a scale like ADOS) are essential to have a complete diagnostic impression and an informed intervention plan [38]. Occupational and physical therapy evaluations should be conducted to evaluate sensory and/or motor difficulties [39]. Based on family history, examination and any dysmorphic features, additional evaluations are recommended to probe for encephalitis or meningitis, hypothyroidism, homocystinuria, head injury, fetal alcohol syndrome or chromosomal abnormalities. Landau-Kleffner syndrome should be ruled out (aphasia and distinctive EEG features). Neurologic consultation and EEG is required (including, MeCP2 gene for possible Rett's disorder if suspected). A Wood's lamp examination for signs of Tuberous sclerosis, as well as genetic testing including G-banded karyotype, Fragile X testing, or chromosomal microarray maybe done if clinically indicated [36,40-42].

[*Intervention*]

Intervention should begin as early as possible, even while evaluation for a definitive diagnosis is ongoing. Intervention should target core features of autism and should be specific, evidence-based, structured and appropriate to the developmental needs of the child. Management should be provided through interdisciplinary teams, coordinated by a Developmental pediatrician/Pediatrician and should include a Child neurologist or psychiatrist, Clinical psychologist, Occupational therapist, Speech and language therapist, Special educator, Nutritionist and Social worker [36].

Intervention models

Many Interventional models are established, such as Behavioral models (*e.g.,* Applied Behavior Analysis or ABA), Structured teaching (*e.g.,* The Treatment and Education of Autistic and related Communication-handicapped Children or TEACCH), Developmental/ relationship-based models (*e.g.,* Floor time) and Integrated programs that use a combination of strategies within the treatment program (*e.g.,* Social Communication, Emotional Regulation and Transactional Support or SCERTS) [36,38]. In terms of co-morbidities, cognitive behavioral therapy has shown effectiveness for anxiety and anger management in high functioning young adults with ASD [36]. Pharmacotherapy may be offered to children with ASD when there is a specific target symptom or co-morbid condition [36,38].

Effectiveness of an intervention

A good educational program for autism depends on the child's chronological age and developmental level, specific strengths and weaknesses and family needs. A recommended program should preferably have [2]: 1:1 or 1:2 (child to therapist ratio), individualized for each child and with an interdisciplinary team that documents evaluation and intervention. Each professional should have specialized expertise in working with children with autism. A minimum of 25 hours per week of services is critical for effectiveness. Ongoing program evaluation and adjustment is necessary. A curriculum emphasizing attention, imitation, communication, play and social interaction is essential. Family involvement is a pre-requisite for the program's effectiveness.

The program goals should include a) enhancing eye contact, social orientation, nonverbal and verbal communication, b) reducing the repetitive and restricted behaviors/ activities/ interests, sensory

issues and hyperactivity (e.g., increasing sitting tolerance), c) improving joint attention and d) improving social, motor, and behavioral capabilities. Individuals with ASD should be offered interventions specifically targeting deficits in social communication/ pragmatic language (group or individually focused) with a focus on social skills, based on empirically supported methods described in a protocol or manual [43,44].

Parent-mediated early intervention

Parent-education and home-interventions are important but not necessarily a substitute to individual intervention for each child; these are more likely to be effective if part of a multidisciplinary intervention program. There is not much scientific evidence for the efficacy of parent-mediated approaches (for outcomes like improved language and communication, improved child initiation and adaptive behavior, reduced parents' stress) [45,46]. However, the evidence for positive change in patterns of parent-child interaction (*e.g*., shared attention or parent-child synchrony) is strong [45,46]. Active involvement of families and/ or caregivers as a form of co-therapy is desirable but only with appropriate supervision, training and monitoring. Parents should help set goals and priorities for their child's treatment, and they should teach or reinforce new skills at home and in the community. Parent-mediated interventions are cost-effective and increase the sense of empowerment on the part of caregivers [45,46].

Educational management

Inclusion: Inclusion is the goal of educational management; though, it needs to be rationalized and practically implemented based on individual situation.

Special services: An appropriate Individualized Educational Plan (IEP) is central in providing effective service *e.g*., Early Start Denver Model and the Treatment and Education of Autism and related Communication-handicapped Children (TEACCH) program [45-49].

Curriculum: Educational plan should reflect an accurate assessment of the child's strengths and vulnerabilities and their relation to academic skills. Modified or special curricula must be adapted and provided to meet optimum education needs of the child.

Provisions: Various boards provide for certification with special provisions for children with autism [36].

Children with ASD need a structured educational approach with explicit teaching. Interventions should be planned, intensive and individualized with an experienced, interdisciplinary team of providers, and family involvement. An accurate assessment of the child's strengths and vulnerabilities is required, with an explicit description of intervention goals and procedures as well as monitoring of effectiveness. A parent-education and home component is important. Both ESDM and TEACCH programs have been found to be effective [47-49].

Psychopharmacologic interventions

Psychopharmacologic interventions can improve the child's functioning and the ability to participate in behavioral interventions. Medication should always be used in conjunction with appropriate

behavioral and environmental interventions. Pharmacologic therapy may also be warranted for the treatment of co-morbid psychiatric or neurodevelopmental conditions, or for specific ('target') behavioral symptoms that interfere with overall functioning [36]. Specific pharmacological treatments have been summarized in Table II and an overview is provided below:

Stimulants for hyperactivity and inattention: Methylphenidate improves symptoms of hyperactivity and inattention in children with ASD, and may also have beneficial effects on social communication and self-regulation. It is recommended when impaired function persists (not due to other causes like anxiety); in spite of behavioral and/or environmental interventions. However, the response rate to methylphenidate is lower in children with ASD, than in children with Attention Deficit Hyperactivity Disorder without ASD. In the largest crossover trial, approximately 50% of children with ASD responded to methylphenidate (as measured on the hyperactivity subscale of the Aberrant Behavior Checklist); with greater improvement at higher doses (0.25 to 0.5mg/kg *versus* 0.125 mg/kg per dose) [50-53]. Adverse effects of methylphenidate include sleep disturbance, decreased appetite, irritability, tics, sadness, dullness and social withdrawal [54,55].

Risperidone for maladaptive behaviors: In case of ineffectiveness of stimulants and/or presence of maladaptive behaviours, risperidone is recommended. Maladaptive behaviors in children with ASD include irritability, aggression, explosive outbursts (tantrums) and self-injury. These behaviors may occur in response to anxiety or frustration, which should be the first targets of management. Maladaptive behaviors can also occur due to anxiety/mood disorders or impulse control problems - if one of these conditions is identified as a cause for the behavior, then medications targeting that symptom should be used.

Risperidone is the most commonly used atypical antipsychotic drug for the treatment of maladaptive behaviors in children with ASD [56]. It is approved for treatment of irritability presenting with aggression, tantrums and/ or deliberate self injury in children (≥5 years) with ASD. Randomized controlled trials and systematic reviews indicate a positive response in individuals with ASD and disruptive behaviors. Risperidone does not significantly affect deficit in social interaction and communication [57]. Adverse effects are usually mild and resolve over a few weeks [58]. Risperidone is recommended to be given for children 5-16 years of age in the dose of maximum 3 mg per day.

Selective Serotonin-Reuptake Inhibitors (SSRIs) for repetitive behaviors and rigidity: Repetitive behaviors, stereotypies, and rigidity in children often interfere with function. Potential treatments for repetitive behaviors in children with ASD include SSRI, clomipramine, atypical antipsychotics and valproate [59]. Fluoxetine (or another SSRI) can be used as the initial medication for repetitive behaviors that require pharmacologic intervention (maximum dose: 10 mg per day). SSRIs have fewer side effects than other agents and may be helpful in treatment of coexisting anxiety. Rigorous studies on use of SSRIs in children with ASD are lacking. The available evidence suggests that fluoxetine may be beneficial for repetitive behaviors and rigidity [60].

Sleep disturbances: Many children with ASD have sleep disturbances, including late onset, frequent waking and restlessness [62]. Sleep disturbances may be related to abnormalities in melatonin, serotonin, or gamma-aminobutyric acid (GABA). The evaluation of sleep disturbances in children with ASD should include a thorough sleep history and screening for obstructive apnea and other sleep disorders. It is important to ensure appropriate sleep hygiene. Behavioral interventions to decrease sleep disturbances should be used, before considering pharmacologic interventions [63]. Medications are unlikely to be effective in the absence of an appropriate sleep schedule. There is little evidence for pharmacologic management of sleep disturbances in children. No medications are approved by the US Food and Drug Administration to address sleep in ASD. However, several are used in clinical practice.

Melatonin is recommended for patients with ASD who have difficulty falling asleep and staying asleep, despite appropriate sleep hygiene and behavioral or environmental interventions. A low starting dose of 0.5 to 1 mg, 30 minutes before sleeping time, regardless of age and weight should be given (maximum dose: 10 mg) [63].

Gastrointestinal problems: The frequency and types of gastrointestinal (GI) disorders in children with ASD are similar to those in children without ASD. These include chronic functional constipation and fecal incontinence; gastroesophageal reflux disease; chronic abdominal pain and chronic diarrhea. GI disorders in children with ASD generally should be managed in the same way as in children without an ASD [64-66].

Anxiety: It is common in individuals with ASD and may contribute to aggressive, explosive, or self-injurious behaviors. Anxiety in children with ASD is treated with the same therapies that are used to treat anxiety in other children. Pharmacotherapy is one arm of a multimodal approach that may include individualized therapy, cognitive behavioral therapy, behavioral interventions/ incentives, accommodations to address sensory sensitivities and special education services [67]. Components of the multimodal therapy may vary from patient to patient. Buspirone (an anxiolytic) is another agent that may be used to treat anxiety in children with ASD [68].

Mood disorders: A number of agents have been used to treat symptoms related to dysregulated mood in children and adolescents with ASD. These include atypical antipsychotics (for maladaptive behaviors), SSRIs (for repetitive behaviors and anxiety) and mood-stabilizing agents (*e.g.,* lithium). None of these agents have been studied specifically for mood regulation in children with ASD.

Depression: Antidepressant therapy, similar to its use in non-ASD children, may be indicated if depressive symptoms persist despite counseling and psychosocial interventions. Side effects include increased incidence of behavioral activation (*e.g.,* impulsivity, silliness, agitation and dis-inhibition) and risk of suicidal ideation. Individuals with ASD may respond to very low doses of SSRI or serotonin norepinephrine reuptake inhibitors, but typical pediatric doses may be necessary. It is important to 'start low and go slow'.

Complementary and alternative therapies: There is no evidence for effectiveness of these therapies and pediatricians should be able to counsel caregivers not to opt for these therapies [36].

Prognosis

In clinical experience, certain factors are known to be associated with positive outcomes; these include: presence of joint attention, functional play skills, higher cognitive abilities, mild severity of ASD symptoms, early identification, involvement in intervention, and a move towards inclusion with typical peers. However, in a recent systematic review, it was shown that less severe sub-types of ASD and early identification predicted favorable outcomes while other factors were inconclusive [69]. In another study, it was noted that development of communicative and language skills at an early age and high IQ could be key predictors of optimal outcomes [70].

Disability Certification

According to the National Trust for the Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act, 1999; various schemes have been made available like Niramaya (Insurance), Aspiration (Early intervention) and Gyan Prabha (scholarship) [71]. Moreover, the notification issued in April 2016 by the Department of Empowerment of Persons with Disabilities under the Ministry of Social Justice and Empowerment, detailed the guidelines for evaluation of Autism and procedure for its certification [71-73]. The IAP expert group recommends that ASD should be diagnosed using the DSM-5 and INCLEN tools and certified using the ISAA. Certification of disability for persons with Autism maybe executed by an Autism Certification Medical Board, duly constituted by the Central Government or the State Government, comprising of a) a Clinical/Rehabilitation Psychologist; b) a Psychiatrist and c) a Pediatrician or General Physician, depending on the specific case. The Government guidelines have requested state governments to constitute these certification medical boards immediately and stated that the certificate should be valid for a period of five years for individuals below 18 years of age with temporary disability; and for those who have acquired permanent disability, should receive 'permanent' validity on their certificates.

CONCLUSIONS

Autism Spectrum Disorder is a complex condition with widely varying clinical manifestations, thus requiring evaluation and intervention by a range of professionals working in coordination. Behavioural and environmental interventions are the key to optimal outcomes, in conjunction with medications for specific symptoms. Parent involvement during intervention is incumbent to sustain therapeutic gains.

Contributors: All authors have contributed, designed and approved the manuscript.

Funding: None; *Competing interest*: None stated.

ANNEXURE I

Participants of the National Consultative Meet

Convener: Dr Samir Dalwai, New Horizons Child Development Center, Mumbai

Experts: (In alphabetical order) Abraham Paul, Cochin; Anjan Bhattacharya, Mumbai; Anuradha Sovani, Mumbai; Bakul Parekh, Mumbai; Chhaya Prasad, Chandigarh; Deepti Kanade, Mumbai; Kate Currawalla, Mumbai; Kersi Chavda, Mumbai; Madhuri Kulkarni, Mumbai; Monica Juneja, New Delhi; Monidipa Banerjee, Kolkata; Mamta Muranjan, Mumbai; Nandini Mundkur, Bangalore; Neeta Naik, Mumbai; P Hanumantha Rao, Telangana; Pravin J Mehta, Mumbai; SS Kamath, Cochin; Samir Dalwai, Mumbai; Sandhya Kulkarni, Mumbai; Shabina Ahmed, Assam; S Sitaraman, Jaipur; Sohini Chatterjee, Mumbai; Uday Bodhankar, Nagpur; V Sivaprakasan, Chidambaram, Tamil Nadu; Veena Kalra, New Delhi; Vrajesh Udani, Mumbai; Zafar Meenal, Bhopal.

Rapporteur*:* Leena Deshpande, Mumbai; Leena Shrivastava, Pune; Ameya Bondre, Mumbai.

Invited but could not attend the meeting*:* MKC Nair, Thrissur; Pratibha Singhi, Chandigarh; Jeeson Unni, Cochin; Manoj Bhatavdekar, Mumbai.

Key Messages

1. The diagnosis of Autism Spectrum Disorder needs the involvement of a multidisciplinary team working together.
2. The intervention administered by a clinician should be 1:1 or 1:2 (child to therapist ratio); individualized for each child and with an interdisciplinary team that documents evaluation and intervention.
3. Parent-education and home interventions are more likely to be effective, if part of a multidisciplinary intervention program.
4. Psychopharmacologic interventions do not treat the underlying ASD. However, they can improve the child's functioning and the ability to participate in behavioral interventions.
5. There is no evidence for effectiveness of 'complementary/ alternative' therapies and pediatricians should be able to counsel caregivers not to opt for these therapies.

REFERENCES

1. Silberberg D, Arora N, Bhutani V, Durkin M, Gulati S, Nair M, *et al.* Neuro-Developmental Disorders in India-From Epidemiology to Public Policy. Neurology. 2014; 82:P7-P324.
2. Myers SM, Johnson CP. Management of children with autism spectrum disorders. Pediatrics. 2007;120:1162-82.
3. Robins DL, Casagrande K, Barton M, Chen CMA, Dumont-Mathieu T, Fein D. Validation of the modified checklist for autism in toddlers, revised with follow-up (M-CHAT-R/F). Pediatrics.. 2014;133;37-45.
4. Chandler S, Charman T, Baird G, Simonoff E, Loucas T, Meldrum D, *et al*. Validation of the social communication questionnaire in a population cohort of children with autism spectrum disorders. J Am Acad Child Adolesc Psychiatry. 2007;46:1324-32.
5. Nair MKC. Autism Spectrum Disorders. Indian Paediatr. 2004;41:541-3.
6. Chawarska K, Klin A, Paul R, Volkmar F. Autism spectrum disorder in the second year: Stability and change in syndrome expression. J Child Psychol Psychiatry. 2007;48:128-38.
7. Landa RJ, Holman KC, Garrett-Mayer E. Social and communication development in toddlers with early and later diagnosis of autism spectrum disorders. Arch Gen Psychiatry. 2007;64:853-64.
8. Landa RJ, Gross AL, Stuart EA, Faherty A. Developmental trajectories in children with and without autism spectrum disorders: the first 3 years. Child Dev. 2013;84:429-42.
9. McConachie H, Le Couteur A, Honey E. Can a diagnosis of Asperger syndrome be made in very young children with suspected autism spectrum disorder? J Autism Dev Disord. 2005;35:167-76.
10. Ozonoff S, Iosif AM, Young GS, Hepburn S, Thompson M, Colombi C, *et al*. Onset patterns in autism: correspondence between home video and parent report. J Am Acad Child Adolesc Psychiatry. 2011;50:796-806.
11. Thurm A, Manwaring SS, Luckenbaugh DA, Lord C, Swedo SE. Patterns of skill attainment and loss in young children with autism. Dev Psychopathol. 2014;26:203-14.
12. Johnson CP, Myers SM. Identification and evaluation of children with autism spectrum disorders. Pediatrics. 2007;120:1183-215.
13. Braun KV, Pettygrove S, Daniels J, Miller L, Nicholas J, Baio J, *et al.* Evaluation of a methodology for a collaborative multiple source surveillance network for autism spectrum disorders--Autism and Developmental Disabilities Monitoring Network, 14 sites, United States, 2002. MMWR. 2007;56:29-40.
14. Volkmar FR, Pauls D. Autism. Lancet. 2003;362:1133-41.
15. De Giacomo A, Fombonne E. Parental recognition of developmental abnormalities in autism. Eur Child Adolesc Psychiatry. 1998;7:131-6.

16. Volkmar F, Wiesner L. Autism and related disorders. In: Carey WB, Crocker AC, Elias ER, Feldman HM, Coleman WL, editors. Developmental-Behavioral Pediatrics. 4th ed. Philadelphia: Saunders Elsevier; 2009. p.675.
17. Teplin SW. Autism and related disorders *In*: Levine MD, Carey WB, Crocker AC, editors. Developmental-Behavioral Pediatrics. 3rd ed. Philadelphia: WB Saunders, 1999. p.589.
18. Johnson CP. Recognition of autism before age 2 years. Pediatr Rev. 2008;29: 86.
19. Saint-Georges C, Mahdhaoui A, Chetouani M, Cassel RS, Laznik MC, Apicella F. *et al*. Do parents recognize autistic deviant behavior long before diagnosis? Taking into account interaction using computational methods. PLoS One. 2011;6:e22393.
20. Ming X, Brimacombe M, Wagner GC. Prevalence of motor impairment in autism spectrum disorders. Brain Dev. 2007;29:565-70.
21. Barrow WJ, Jaworski M, Accardo PJ. Persistent toe walking in autism. J Child Neurol. 2011;26:619-21.
22. Stone WL, Lemanek KL, Fishel PT, Fernandez MC, Altemeier WA. Play and imitation skills in the diagnosis of autism in young children. Pediatrics. 1990;86:267-72.
23. Filipek PA, Accardo PJ, Ashwal S, Baranek GT, Cook EH, Dawson G, *et al.* Practice parameter: Screening and diagnosis of autism: Report of the Quality Standards Subcommittee of the American Academy of Neurology and the Child Neurology Society. Neurology. 2000;55:468-79.
24. Kientz MA, Dunn W. A comparison of the performance of children with and without autism on the Sensory Profile. Am J Occup Ther. 1997;51:530-7.
25. McElhanon BO, McCracken C, Karpen S, Sharp WG. Gastrointestinal symptoms in autism spectrum disorder: a meta-analysis. Pediatrics. 2014; 133:872-83.
26. Bresnahan M, Hornig M, Schultz AF, Gunnes N, Hirtz D, Lie KK, *et al.* Association of maternal report of infant and toddler gastrointestinal symptoms with autism: evidence from a prospective birth cohort. JAMA Psychiatry. 2015; 72:466-74.
27. American Psychiatric Association. Diagnostic and statistical manual of mental disorders, fifth edition. Arlington, VA: American Psychiatric Association; 2013.
28. Juneja M, Mishra D, Russell PS, Gulati S, Deshmukh V, Tudu P, *et al.* INCLEN diagnostic tool for autism spectrum disorder (INDT-ASD): Development and validation. Indian Pediatr. 2014;51:359-65.
29. Mukherjee SB, Malhotra MK, Aneja S, Chakraborty S, Deshpande S. Diagnostic accuracy of Indian Scale for Assessment of Autism (ISAA) in chidren aged 2–9 years. Indian Pediatr. 2015;52:212-16.
30. Russell PS, Daniel A, Russell S, Mammen P, Abel JS, Raj LE, *et al.* Diagnostic accuracy, reliability and validity of Childhood Autism Rating Scale in India. World J Pediatr. 2010;6:141-147.

31. Rudra A, Banerjee S, Singhal N, Barua M, Mukerji S, Chakrabarti B. Translation and usability of autism screening and diagnostic tools for autism spectrum conditions in India. Autism Res. 2014;7:598-607.
32. Le Couteur A, Rutter M, Lord C, Rios P, Robertson S, Holdgrafer M, *et al.* Autism diagnostic interview: A standardized investigator-based instrument. J Autism Dev Disord. 1989;19:363-87.
33. Lord C, Rutter M, Le Couteur A. Autism Diagnostic Interview Revised: a revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. J Autism Dev Disord. 1994;24: 659-85.
34. Lecavalier L, Aman MG, Scahill L, McDougle CJ, McCracken JT, Vitiello B. *et al.* Validity of the autism diagnostic interview-revised. Am J Ment Retard. 2006;111:199-215.
35. Dalwai SH, Modak DK, Bondre AP, Gajria D. Analysis of tools for diagnosing autism spectrum disorder in the Indian context. Acad J Ped Neonatol. 2016; 1:555-62.
36. Volkmar F, Siegel M, Woodbury-Smith M, King B, McCracken J, State M. Practice parameter for the assessment and treatment of children and adolescents with autism spectrum disorder. J Am Acad Child Adolesc Psychiatry. 2014; 53:237-57. Available from: *http://www.jaacap.com/article/S0890-8567(13)00819-8/pdf.* Accessed: January 14, 2017.
37. Volkmar FR, Wiesner LA. A Practical Guide to Autism: What Every Parent, Family Member, and Teacher Needs to Know. Hoboken, NJ: John Wiley; 2009.
38. Paul R, Sutherland D. Enhancing early language in children with autism spectrum disorders. *In*: Volkmar F, Klin A, Paul R, Cohen D, editors. Handbook of Autism and Pervasive Developmental Disorders. 3rd ed. New Jersey: John Wiley, Hoboken; 2005. p. 946-76.
39. Baranek GT, Parham LD, Bodfish JW. Sensory and motor features in autism: assessment and intervention. In: Volkmar FR, Klin A, Paul R, Cohen DJ, editors. Handbook of Autism and Pervasive Developmental Disorders. 3rd ed. New Jersey: John Wiley, Hoboken; 2005. p. 88-125.
40. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorder, 4th ed, text rev. Washington, DC: American Psychiatric Press; 2000.
41. Camfield P, Camfield C. Epileptic syndromes in childhood: clinical features, outcomes, and treatment. Epilepsia. 2002;43:27-32.
42. Schaefer GB, Mendelsohn NJ. Genetics evaluation for the etiologic diagnosis of autism spectrum disorders. Genet Med. 2008;10:4-12.
43. Kendall T, Megnin-Viggars O, Gould N, Taylor C, Burt LR, Baird G. Management of autism in children and young people: summary of NICE and SCIE guidance. BMJ. 2013;347:f4865
44. Maglione MA, Gans D, Das L, Timbie J, Kasari C. Nonmedical interventions for children with ASD: Recommended guidelines and further research needs. Pediatrics. 2012;130:S169-S78.

45. Oono IP, Honey EJ, McConachie H. Parent-mediated early intervention for young children with autism spectrum disorders (ASD). Evid Based Child Health. 2013;8:2380-479.
46. Zwaigenbaum L, Bauman ML, Choueiri R, Kasari C, Carter A, Granpeesheh D, *et al.* Early intervention for children with autism spectrum disorder under 3 years of age: recommendations for practice and research. Pediatrics. 2015; 136:S60-S81.
47. National Research Council. Educating Children with Autism. Washington, D.C.: National Academy of Sciences Press; 2001.
48. Dawson G, Rogers S, Munson J, Smith M, Winter J, Greenson J, *et al.* Randomized, controlled trial of an intervention for toddlers with autism: the Early Start Denver Model. Pediatr. 2010;125:e17-e23.
49. Ozonoff S, Cathcart K. Effectiveness of a home program intervention for young children with autism. J Autism Dev Disord. 1998;28:25-32.
50. Handen BL, Johnson CR, Lubetsky M. Efficacy of methylphenidate among children with autism and symptoms of attention-deficit hyperactivity disorder. J Autism Dev Disord. 2000;30:245-55.
51. Research Units on Pediatric Psychopharmacology (RUPP) Autism Network. Randomized, controlled, crossover trial of methylphenidate in pervasive developmental disorders with hyperactivity. Arch Gen Psychiatry. 2005;62: 1266-74.
52. Posey DJ, Aman MG, McCracken JT, Scahill L, Tierney E, Arnold LE, *et al*. Positive effects of methylphenidate on inattention and hyperactivity in pervasive developmental disorders: an analysis of secondary measures. Biol Psychiatry. 2007;61:538-44.
53. Jahromi LB, Kasari CL, McCracken JT, Lee LS, Aman MG, McDougle CJ, *et al*. Positive effects of methylphenidate on social communication and self-regulation in children with pervasive developmental disorders and hyperactivity. J Autism Dev Disord. 2009:39:395-404.
54. Towbin KE. Strategies for pharmacologic treatment of high functioning autism and Asperger syndrome. Child Adolesc Psychiatr Clin N Am. 2003;12:23-45.
55. Aman MG, Farmer CA, Hollway J, Arnold LE. Treatment of inattention, overactivity, and impulsiveness in autism spectrum disorders. Child Adolesc Psychiatr Clin N Am. 2008;17:713-38.
56. McVoy M, Findling R. Child and adolescent psychopharmacology update. Psychiatr Clin North Am. 2009;32:111.
57. McDougle CJ, Scahill L, Aman MG, McCracken JT, Tierney E, Davies M, *et al.* Risperidone for the core symptom domains of autism: results from the study by the autism network of the research units on pediatric psychopharmacology. Am J Psychiatry. 2005;162:1142-8.
58. Barnard L, Young AH, Pearson J, Geddes J, O'brien G. A systematic review of the use of atypical antipsychotics in autism. J Psychopharmacol. 2002;16: 93-101.

59. Huffman LC, Sutcliffe TL, Tanner IS, Feldman HM. Management of symptoms in children with autism spectrum disorders: A comprehensive review of pharmacologic and complementary-alternative medicine treatments. J Dev Behav Pediatr; 2011;32:56-68.
60. McPheeters ML, Warren Z, Sathe N, Bruzek JL, Krishnaswami S, Jerome RN, *et al.* A systematic review of medical treatments for children with autism spectrum disorders. Pediatrics. 2011;127:e1312-e21.
61. Frye RE, Rossignol D, Casanova MF, Martin V, Brown G, Edelson SM, *et al*. A review of traditional and novel treatments for seizures in autism spectrum disorder: findings from a systematic review and expert panel. Front Public Health. 2013;1:1-26.
62. Elrod MG, Hood BS. Sleep differences among children with autism spectrum disorders and typically developing peers: A meta-analysis. J Dev Behav Pediatr. 2015;36:166-77.
63. Melatonin and Sleep Problems in ASD: A Guide for Parents. Available from: *https://www.autismspeaks.org/sites/default/files/docs/sciencedocs/atn/melatonin_guide_for_parents.pdf*. Accessed: January 23, 2016.
64. Buie T, Campbell DB, Fuchs GJ, Furuta GT, Levy J, VandeWater J, *et al.* Evaluation, diagnosis, and treatment of gastrointestinal disorders in individuals with ASDs: a consensus report. Pediatrics; 2010;125: S1-S18.
65. Scottish Intercollegiate Guidelines Network. Assessment, diagnosis and clinical interventions for children and young people with autism spectrum disorders. A national clinical guideline. Scottish Intercollegiate Guidelines Network, Edinburgh 2007. Available from: *www.sign.ac.uk/guidelines/fulltext/98/index.html*. Accessed May 7, 2016.
66. Buie T, Fuchs GJ, Furuta GT, Kooros K, Levy J, Lewis JD, *et al.* Recommendations for evaluation and treatment of common gastrointestinal problems in children with ASDs. Pediatrics. 2010;125:S19-S29.
67. White SW, Oswald D, Ollendick T, Scahill L. Anxiety in children and adolescents with autism spectrum disorders. Clin Psychol Rev. 2010;29:216-29.
68. Posey DJ, Guenin KD, Kohn AE, Swiezy NB, McDougle CJ. A naturalistic open-label study of mirtazapine in autistic and other pervasive developmental disorders. J Child Adolesc Psychopharmacol. 2001;11:267-77.
69. Steinhausen HC, Mohr Jensen C, Lauritsen MB. A systematic review and meta-analysis of the long-term overall outcome of autism spectrum disorders in adolescence and adulthood. Acta Psychiatr Scand. 2016;133:445-52.
70. Mukaddes NM, Tutkunkardas MD, Sari O, Aydin A, Kozanoglu P. Characteristics of children who lost the diagnosis of autism: A sample from istanbul, Turkey. Autism research and treatment. 2014; *http://dx.doi.org/10.1155/2014/472120*.
71. Bhargava A. School Education of Children with Special Needs in India with a Perspective on the Initiatives for Children with Autism. Available from:

http://www.iccwtnispcanarc.org/upload/pdf/1494590016school%20edcation%20special%20needs%20india.pdf . Accessed: January 14, 2017.

72. Government of India. Guidelines for Evaluation and Assessment of Autism and Procedure for certification. Available from: *http://disabilityaffairs.gov.in/upload/uploadfiles/files/Autism%20Guidelines-%20Notification_compressed.pdf*. Accessed: January 14, 2017.
73. Barua M, Kaushik JS, Gulati S. Legal provisions, educational services and health care across the lifespan for autism spectrum disorders in India. Indian J Pediatr. 2017; 84:1-7.

TABLE I SOME DIAGNOSTIC TOOLS FOR AUTISM

Name of the tool	*Time taken (approx)*	*Age-group*	*Cost*	*Languages*
INCLEN tool (INDT-ASD)	45-60 minutes	2-9 years (as per the validation study)	Free	Hindi, English, multiple regional languages
ISAA	20-30 minutes	3-9 years	Free	
ADI	120 minutes	2 years and above	$ 261*	English
ADOS	40-60 minutes	12 months and above	$2095*	Hindi, Bengali, English

*Last accessed in January 2017

TABLE II DRUGS AVAILABLE FOR PHARMACOLOGICAL MANAGEMENT OF AUTISM SPECTRUM DISORDERS

#	*Drug name*	*Indications*	*Dose*	*Side-effects*
1	Methylphenid-ate	Impaired function in spite of behavioural and environmental interventions	10-40 mg each morning, extended release	Sleep disturbance, decreased appetite, irritability, tics, sadness, dullness and social withdrawal
2	Risperidone	Ineffectiveness of stimulants and/or maladaptive behaviours	0.5-3.5 mg/day	Weight gain, increased appetite, fatigue, drowsiness, drooling, dizziness
3	Atomoxetine	Methylphenidate not tolerated	1.2 mg/kg/day	Nausea, anorexia, fatigue, early wakening
4	Fluoxetine	Repetitive behaviours and rigidity	2.4-20 mg/day, mean 9.9 mg/day	None significant