



## Original Research Article

# A brief about autism spectrum disorders for nurses and other peripheral health workers

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### ABSTRACT

Autism spectrum disorder encompasses a wide range of neurodevelopment disabilities which affect children and their families across all sections of the society both in rural and urban settings. The prevalence of autism is rising irrespective of the socioeconomic background of the children. Hence every health worker has to be aware of ways to suspect and diagnose this condition and decide the appropriate treatment. Earliest intervention in autism spectrum disorder gives better results due to neuroplasticity. This article is targeted to help Medical officers, auxiliary nurse midwives, anganwadi workers and other peripheral health workers by providing information on basics of ASD, normal speech development, simple ways for diagnosis and treatment for the same.

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## 1. Introduction

Autism is a neuro developmental disorder characterized by persistent deficits of social communication and interaction; restricted and repetitive behaviours, interests, activities.<sup>1</sup> Many children show symptoms of autism by 12 months to 18 months of age or earlier, lacking imaginative play, poor interaction with peers and being particular about how their activities are conducted and so on.<sup>2,3</sup> Some children with autism reach their developmental milestones only to gradually regress later into autism.<sup>4,5</sup> Recently, according to a systematic review of the South Asian countries like India, Bangladesh and Sri Lanka population have reported a prevalence rate of 0.09 % to 1.07 % among children in the age group of 0 – 17 years with Autism Spectrum Disorders. This percentage translates into a large number for Indian Population which shows the importance of general awareness of ASD amongst nurses, peripheral health workers working under RBSK, Rashtriya Bal Swasthya Karyakram. RBSK is a national programme aiming at early

identification and early intervention for children from birth to 18 years to cover 4 'D's viz. Defects at birth, Deficiencies, Diseases, Development delays including disability.

## 2. Discussion

### 2.1. Neurophysiology

It is important to understand the stages in the development of the brain beginning from neurogenesis till myelin formation. Studies have identified many processes including neural migration, maturation, synaptogenesis, pruning, myelin formation which take part in brain plasticity.<sup>6</sup>

Migration is an important step in development of various areas. It has been shown that in both humans and in experimental animals if there is abnormal migration then it leads to severe developmental malformations which are often linked to mental retardation and deficits in cognition.<sup>7</sup> Migration is then followed by the dendritic growth and sometimes there is excessive growth which is being taken care by a process known as synaptic pruning using various range of experiences, epigenetic changes, environmental

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factors.<sup>6</sup> These effects of pruning and cell loss translates into changing of cortical thickness. MRI studies have shown that children with normal or enhanced understanding of speech sounds have thickening of left inferior frontal cortex (roughly Broca’s area). Thus, the relation between behavioural development and cortical thickness is likely explanation for the variance in the development of skills like language in children.<sup>8</sup> In infancy itself, the foundations of language are established and can be observed well before spoken language emerges.<sup>9</sup> Thus, the earlier we can diagnose very minute developmental delays and work upon it by paying detailed attention, then it may help in better prognosis in case it turns out to be a developmental delayed child. When there is incoming auditory stimulus towards a child, the developing brain constructs acoustic maps of the sounds of its native language, thereby allowing the child to respond quickly to the native incoming language.<sup>10,11</sup> Neural plasticity as well as the exquisite sensitivity of the developing brain towards environmental cues are very crucial for the construction of these acoustic maps which play a major role in language construction and processing.<sup>12,13</sup> The accurate perception of rapid acoustic change in children is very important as the ability of the brain to decode the incoming speech is dependent upon this.<sup>14-17</sup> Unstable representation of sound and distorted neural boundaries can occur as a result of difficulties in biological encoding.<sup>18,19</sup>

2.2. Stages of speech and language development

There are roughly 4 stages of speech development which span across the first year of the child. It begins with reflexive vocalisation till complete formation of proper sentences and imaginative stories. Speech and language development is further divided into receptive language and expressive language. Receptive language development includes hearing and understanding while expressive language includes talking. A detailed description of the stages of development is present

2.3. Diagnosis and presentation of autism spectrum disorders

The diagnosis of ASD is dependent on detailed developmental history and behaviour. ASD is diagnosed according to the latest DSM V criteria. We have tried to present a simplified version of DSM V criteria at the end of the article. Parents are also educated about various red flags which can be seen according to various age groups and that should raise some suspicion. Some of the red flags have been also shown at the end. Children with autism spectrum disorder (ASD) can be oversensitive or under sensitive to stimuli such as noise, light, clothing or temperature or oversensitive to some sound frequencies and under sensitive to others.<sup>20</sup> Some examples of different sensory sensitivities

Table 1: Diagnostic tools for Autism Spectrum disorder

Name of Tool	Time taken (approx.)	Age group	Cost	Languages
Inclen (INDT-ASD)	45-60 minutes	2-9 years (as per validation study)	Free	Hindi, English, multiple regional languages
ISAA	20-30 minutes	3-9 years	Free	English
ADI	120 minutes	2 years and above	\$ 261	Hindi, Bengali, English
ADOS	40-60 minutes	12 months and above	\$ 2095	
CARS	15-20 minutes	2 years and above		
MCHAT	5-10 minutes	18-36 months		

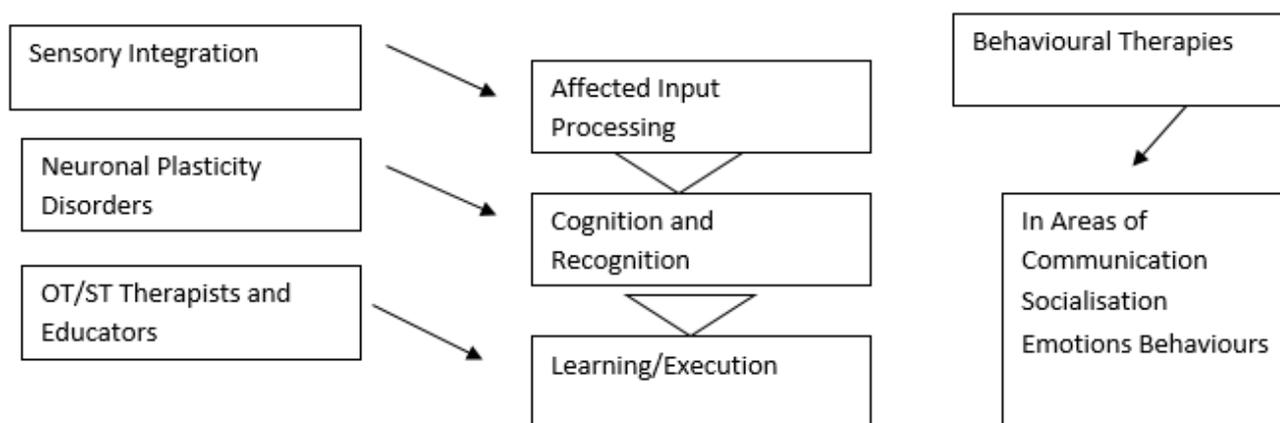
**Table 2:** Different pharmacotherapeutic and nutrient options in Autism Spectrum Disorder

Parameter	Medicine Tried	Dose
Hyperkinesia	Risperidone	0.5-3.5mg/day
Anxiety	Fluoxetine	2.4-20mg/day
Cognition	Choline	250-500mg/day
Communication processing defect	Piracetam	50-100mg/day
Visual Perception	Omega 3	1g-2.5 g/day
Constipation	Lactulose	1-3ml/kg/day
Depression	Escitalopram	10-20mg/day
Sensory issues	Fexofenadine	30-60mg/day
Neuro and myelin generation	Vitamin B12, Folate,	
Dysbiosis	Specific probiotics	
Claimed less beneficial/ useful	Chelation, Stem cells, homeopathy,	

\*Doses need to be altered according to the age, weight and severity.

**Table 3:** Red flags which might suggest for immediate speech and language evaluation

By 6 months:	Few or no big smiles or other warm, joyful engaging expressions	Limited or no eye contact
By 9 months:	Little or no back and forth sharing of sounds, smiles and other facial expressions	
By 12 months:	Little or no babbling	Little or no back and forth gestures such as pointing, showing, reaching or waving
	Little or no response to name	
By 16 months:	Very few or no words	
By 24 months:	Very few or no meaningful two word phrases (not including imitating or repeating)	



**Fig. 1:** Summary of treatment for Autism Spectrum disorder

are that children might like bright colours, or squint when out in sunlight, like to feel different textures, or might sniff everything, or complain about smells, might not be able to stand being in noisy environments, or constantly need music on, might seem to ‘throw’ themselves across people, or stand on people’s toes, might move in poorly planned and uncoordinated ways, might ignore injuries or have delayed responses to injuries, or they might overreact to little hurts. Children with ASD often may repeat behaviours or have narrow, restricted interests which can affect eating habits and food choices and lead to health concerns. They can have limited food selection or strong food dislikes due to sensitivity to the taste, smell, colour and texture of foods and limit or totally avoid some foods or whole food groups. They also might not be eating enough food due to difficulty

focusing on one task for an extended period of time and may be hard for a child to sit down and eat a meal from start to finish. The child’s limited food choices, low physical activity levels or medications can give rise to constipation. Constipation is also a result of faulty visceroreception and manifests in many kids.

*2.4. Role of peripheral health care workers*

At peripheral rural and suburban areas mostly, screening of children of various age groups on the basis of various screening tools of language and speech development is done under RBSK (Rashtriya Bal Swasthya Karyakram,) a government scheme. There are two levels of screening in RBSK i.e. at community level and facility level.

**Table 4:** Simplified Version of DSM 5 Criteria for diagnosis of Autism Spectrum Disorders<sup>1</sup> Core /major Criteria [one each of A1 A2 A3] PLUS Minor Criteria one each of B1 B2 will make diagnosis

<b>A</b>	<b>Persistent deficits in social communication and social interaction across multiple contexts</b>
1. Deficits in social-emotional reciprocity	1. Abnormal social approach 2. Abnormal back and forth conversation 3. Reduced sharing of interests, emotions, feelings, affect 4. Failure to initiate or respond to social interactions.
2. Deficits in nonverbal communicative behaviours	1. Poor eye contact, poor non-verbal, or verbal communication. 2. Poor eye contact, poor body language 3. Deficit in use of gestures 4. Total lack of facial expressions or lacks of nonverbal communication
3. Deficits in developing, maintaining, and understand relationships	1. Difficulty in adjusting behaviours to various social contexts. 2. Difficulty in sharing imaginative play or making friends. 3. Absence of interest in peers or friends.
<b>B</b>	<b>Restricted, repetitive patterns of behaviour, interests, or activities</b>
1. Repetitive movements /stereotypes with :	1. Objects 2. Movements. 3. Lining up toys, shoes etc. 4. Flipping objects / movements 5. Repetitive words: echolalia / copying 6. Repetitive phrases with or without meaning.
2. Sameness / Rigidness:	1. Extreme distress at small change. 2. Difficulty in change or transition from routine. 3. Rigid thinking patterns. 4. Greeting rituals. 5. Need to take same route 6. Same food pattern every day.
3. Restricted fixed interest or focus:	1. Strong attachment / unusually busy with unusual objects 2. Excessive circumscribed interest-not to confuse with passion: highly preferred interest that makes child non sharing, inflexible and its interest without its usefulness or progress.
4. Hypo or hyper response to sensory input	1. Sound / texture 2. excessive smelling / touching 3. Visual Fascination with light or movement
C Symptoms must be present in the early developmental period	Was all this present before age six years? Did it manifest only after stress like studies?
D Symptoms cause clinically significant impairment	Definitely affecting day to day life or schooling?
E These disturbances are not better explained by intellectual disability	Whether developmental delay , Mental subnormality, Developmental age inappropriate is present

The community level screening will be conducted at Anganwadi Centres and Government and Government aided Schools by the Mobile health teams, while facility based new born screening occurs at public health facilities like PHCs / CHCs/ DH, by existing health manpower like Medical Officers, Staff Nurses & ANMs. After the initial step of screening of children, the next important step is confirmation of preliminary findings, support for referrals, treatment and follow up. Under RBSK, these activities are planned according to the age group of the child. The early intervention centres are established at the District Hospital level across the country as District Early Intervention Centres (DEIC) and the purpose of these DEIC is to provide referral support to children detected with developmental delays during specific screening, primarily for children up to 6 years of age group. A team consisting of Paediatrician, Medical officer, Staff Nurses, Paramedics

should be engaged to provide services.<sup>21</sup> Thus, it has become of paramount importance for all the health workers to acquaint themselves with the basics of ASD for early detection and proper referrals under these government schemes and systems.

### 2.5. Treatment of autism spectrum disorder

Currently, there is no treatment to cure ASD, but as we call it a disorder, we attempt to put it in order. Several interventions have been developed which may reduce symptoms, help improve cognitive ability and daily living skills, and maximise the ability of the child to participate in the community.<sup>22–27</sup> Early interventions should be insisted even before the diagnosis and as early as 1 or 2 years of age, since in this period, a child's brain is still forming and is more "plastic" than at older ages. Hence, interventions

**Table 5:** Stages of normal speech development-

First stage	0-2 Months (Reflexive Vocalisation) 1] Getting ready to listen- initiation. 2] understanding speech- arousal. In this stage, the sounds produced by the infants includes sounds expressing discomfort like crying, vegetative sounds like burping and sounds related to physical activity like grunting
Second stage	2-4 Months (Cooing and laughter) 3] Following speech - regulation. 4]. Obeying commands- converting to non verbal communication This stage is characterised by the appearance of comfort sounds, which normally occur when other people smile and talk
Third stage.	4-7 Months 5]. Non verbal communication 6]. Vocalisation This stage is characterised by vocal play sounds like squeals, which are made possible by the maturation and better control of articulation. This stage also sees the beginning of primitive babbling, with sounds starting to resemble consonants and vowels.
Fourth stage	Consists of A. Reduplicated 7]. Meaningless sounds 8]. Meaningful sounds 9]. Vowels B. Variegated 10]. Meaningless words followed by meaningful words 11]. Echolalia 12]. Prosody 13]. Jargon 14]. Joining words to form sentences
Finally, after proper development of vocalization:	15]. Learning verbs 16]. Understanding and copying actions in words. 17]. Joining two words to form a sentence. 18]. Forming many sentences. 19]. Poems and rhymes. 20]. Stories and speech fluency 21]. Imaginative stories

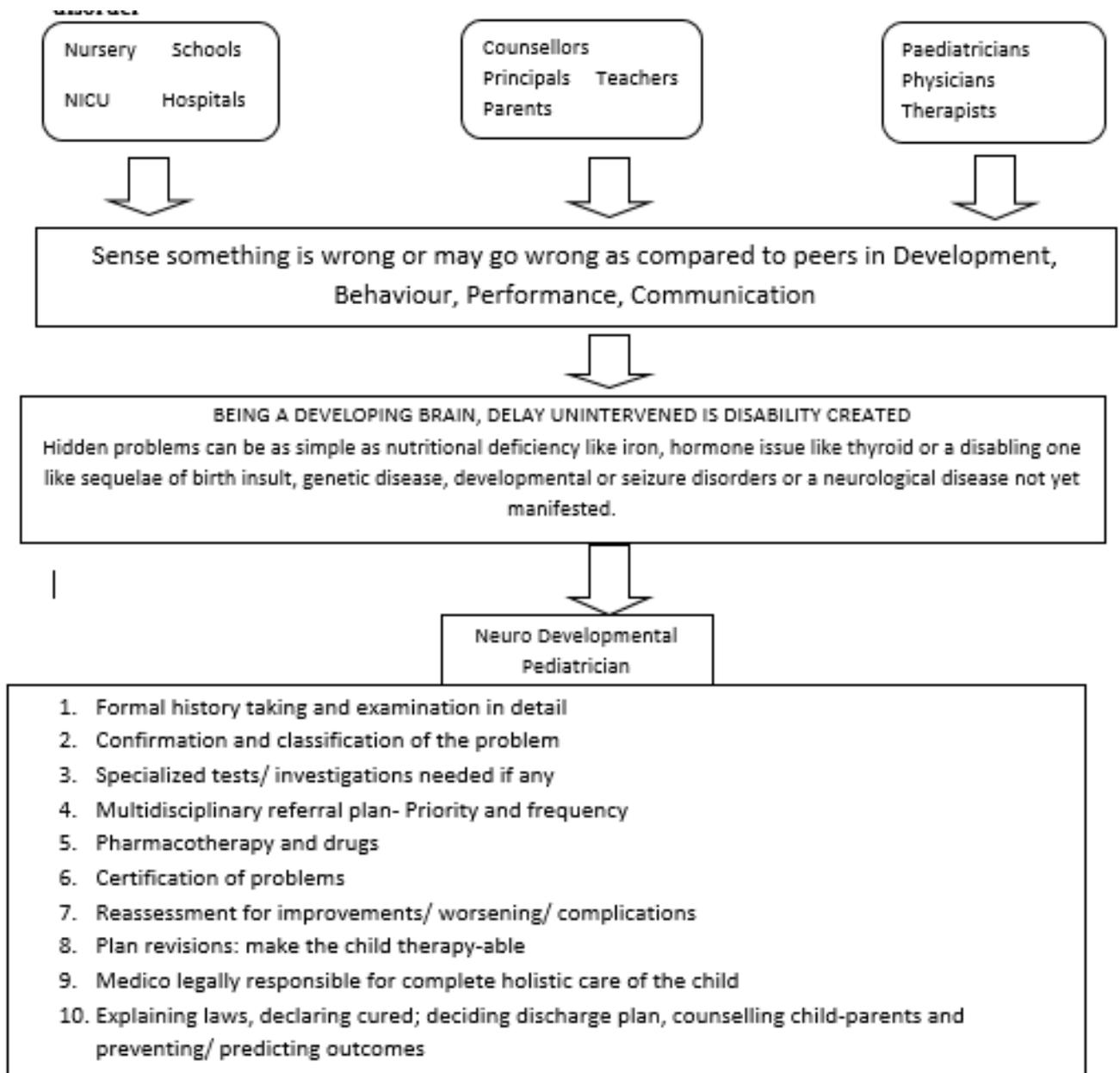
and nutritional treatments may have a better chance of being effective in the longer term.<sup>28,29</sup>

Early intervention often focuses on four key areas of children's development: physical development, cognitive development, behavioural development and emotional development. There are ways but no structure as each kid may be likely to be stuck at different level, many therapies need to be individualised depending on the child's response. Occupational therapy with behavioural applications does help with fine motor skills, play and self-help skills, sensory integration. Physiotherapy can help with motor skills like balance, sitting, crawling and walking. Speech therapy can help with development of speech, language, eating and drinking skills by providing constructional active input depending on the stage of speech deficit. They train them by exposing them to the same active stimulus repeatedly to improve their communication skills and vocabulary. Psychological therapy can help with forming relationships, coping with emotions and learning behaviours and skills.<sup>30,31</sup> Risperidone and fluoxetine are some of the drugs which act as pharmacological therapy in ASD. Music therapy has proved to improve non-musical abilities such as communication, social and academic standards among individuals with ASD. Songs and chants lead to rhythm of speech and body movement which improve the non-verbal

behaviours of ASD children and enhance social skills.

Behaviour therapy is the proven therapy practised all over the world but most of the occupational therapist and speech therapists do inculcate behaviour therapy tricks in their routine practice. So non availability of behavioural therapist in nearby area shouldn't discourage parents from starting any available therapies.

Home therapy measures play an important role for children with autism spectrum disorder can done by parents by spending extra time with children. They include reading story books for children and trying to show them and explain things going around them in a commentary manner. Parents should also try to improve their social skills and try to make the child independent enough to carry out their day to day activities. The child should be exposed to radio in order to improve their vocabulary and communication but however should be kept away from television and mobile. Radio as a medium of passive sound therapy instead of music will be more beneficial in understanding vocal sounds. Joint family children performed better language and social skills compared to nuclear and extended families.<sup>32</sup> This indirectly explains the role of auditory stimulus in vocabulary development of child. However, studies have shown that there is a positive correlation between early onset, high frequency television /mobile/video/ games



**Fig. 2:** The following algorithm can be followed in case of suspicion of autism spectrum disorder

viewing and subsequent language development delay.<sup>33</sup> Nutritional supplements like omega, carnosine, citicoline have also been tried.<sup>34–36</sup>

### 3. Conclusion

Autism Spectrum Disorders is a wide range of disorders which goes unrecognized in rural and peripheral settings.<sup>37</sup> Rising prevalence of autism due to various reasons and inability to cure makes many parents go for random approaches. A definite understanding and direction needs to be given to parents to be optimistic and also to not waste

the early years of life by neglecting therapy and medical approach. History or evidence of age-inappropriate poor eye contact has been the consistent symptom in all autism kids at different ages. This should always raise an alarm as early as possible to start early intervention therapy and medication program as needed. This article compiles most of the basic information on Autism Spectrum Disorders and it may further help all the peripheral health workers in better screening and referral of children with developmental disabilities.

#### 4. Conflict of Interest

The authors declare that there are no conflicts of interest in this paper.

#### 5. Source of Funding

None.

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