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PHYSIOTIMES™

India's first Magazine for Physiotherapists, of Physiotherapists, by Physiotherapists

A special issue on Autism

A Snapshot of Autism
A Life full of Care & Challenges

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A Veteran OT's Perspective on Autism

A discussion with Hanna Alonim
Mifne Concept of Early Intervention in Autism

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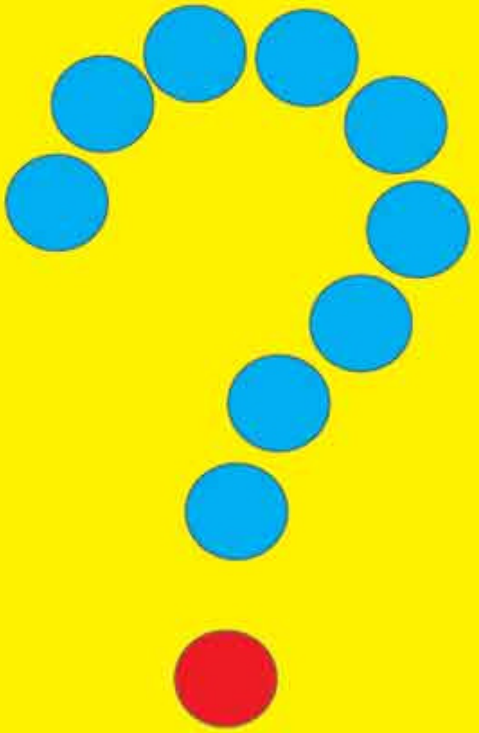

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Autism Connect and NeuroGen Brain and Spine Institute, Mumbai, India have been given the rights to distribute this particular Special Issue of PHYSIOTIMES on Autism worldwide, via pdf, electronically as well as hard copies.

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ROLE OF PHYSIOTHERAPIST IN AUTISM

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From the Editor's Desk

Dear Readers,

Soham, a cute little boy aged 6 years appears smart, affectionate and confident like most boys of his age do. After spending some time with Soham, you'd probably notice he's a little different from a "typical" six year old but his smile alone wouldn't give anything away. When you delve deeper you realize that he finds social interaction challenging and it is difficult for him to communicate verbally and even non-verbally. There are times when he behaves in a stereotyped manner and shows loss of interest in day to day activities. Soham suffers from what medical science has termed as "***Autism Spectrum Disorder***". His is ***a journey of hope against despair.*** And yes, **there is HOPE.**

This special issue of **PHYSIOTIMES** focuses on **Autism** and is an attempt to look at the condition and its management from a holistic perspective and how a multi disciplinary team of health care professionals through a myriad of interventions can assist children with ASDs and their parents and family members in coping with it.

We thank Dr. Alok Sharma, Director, NeuroGen Brain and Spine Institute, Mumbai and his entire team who took the initiative to put together this special issue and have worked relentlessley with our team to bring the expertise of authors from across the globe under one platform for the benefit of our readers as well as those seeking to know more about Autism. We thank Dr. Nandini Gokulchandran deputy director at NeurGen for her continued support and help. We also express our gratitude to Ms. Akshata Shetty, psychologist at NeuroGen, for being a bridge between the authors and our editorial team and helping us in every way to make this issue see the light of the day.

Hope this issue serves as a ready reckoner on Autism for you and helps you serve those little wonders of God live a more meaningful & independent life.

Best wishes,

Dr. Bhumika Nayak, PT
Editor-in-chief

"Hope sees the invisible, feels the intangible & achieves the impossible."

Guest Editor

There are certain disorders, where despite the best available medical and rehabilitative treatments, we have not been able to give the patients satisfactory relief in their mental and physical symptoms or help them to regain the abilities to integrate with society. Autism is one such disorder.

A look at the development of the advances in the medical sciences shows that the solutions to difficult untreatable disorders have always come from a multi-disciplinary approach. It is only when people from different specialties pool their knowledge, skills and resources that break-throughs happen in incurable or difficult to treat medical conditions.

In the past, Autism was basically treated by Occupational therapists, Psychologists, Speech therapists and Special educators. However, recent developments have highlighted the important role that physiotherapists have to play in the overall management of Autism. There are now available several scientific papers in international journals that highlight the importance of physical therapy in Autism.

Recent publications have also shown the effectiveness of Stem Cell Therapy in Autism and this has opened up an entire new world of possible treatment options for these children. Not only have patients shown dramatic clinical improvements after stem cell therapy but post treatment investigations such as PET CT scans of the brain have shown objective improvements in the brain functions of these patients. Physiotherapists have played an important role in the post stem cell therapy rehabilitation of different neurological conditions.

The fact that 1 out of 250 children in India and 1 out of 88 children in USA are diagnosed with Autism highlights the importance of this condition to society at large. We therefore acknowledge the vision of Physiotimes, in making available to the physiotherapy community, a comprehensive insight into an important clinical condition in which Physiotherapists need to be part of a multidisciplinary rehabilitation team. This issue of Physiotimes, which has contributory articles of different specialists from across the country, very clearly highlights how experts from different fields need to come together to be able to make a difference to the lives of children with Autism as well as their families.

> This issue of Physiotimes, which has contributory articles of different specialists from across the country, very clearly highlights how experts from different fields need to come together to be able to make a difference to the lives of children with Autism as well as their families.

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A Peek into the world of Autism

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Referrals of autism in physiotherapy are mixed up with some motor problem surfaced, hypotonia in particular. Earlier, Mental retardation (MR) was the common stamp put to club a host of such problems; the term was replaced by mental sub-normalcy. However, it was realised that some psychological problems are detected in pre-school or school ages and a term minimally brain damaged (MBD) was in vogue. But this minimally meant probably the severity of the motor aspects and not other functions impaired. At times, some events manifested by MBD children may be mistaken as just behavioural problems. MR infants also have delayed motor milestones but delay is in time span and as they grow in age, physical events like posture, hand function and gait are likely to develop to functional levels with minor deviations. This does not happen in CP since some primitive patterns, deficits in automatisms and in voluntary control do remain lifelong. With risk babies early referrals are made to PT department and if motor development is not hampered, likely, the parents may be off the guard; it is imperative that follow up be continued well beyond 2-3 years to detect those subsequent manifestations. Evaluation process must be more comprehensive than just physical impairment.

Some interesting historical events

The earliest well-documented case of autism is that of Hugh Blair of Borgue, as detailed in a 1747 court case in which his brother successfully petitioned to annul Blair's marriage to gain Blair's inheritance.[1] Leo Kanner of the Johns Hopkins Hospital first used the term autism when he introduced the label early infantile autism in a 1943 report of 11 children with striking behavioral similarities.[2] Almost all the characteristics described in Kanner's first paper on the subject, notably "autistic aloneness" and "insistence on sameness", are still regarded as typical of the autistic spectrum of disorders.[3]

The prevalence of autism is about 1–2 per 1,000 people worldwide, and the Center for Disease Control and Prevention (CDC) report 20 per 1,000 children in the United States are diagnosed with ASD as of 2012 (up from 11 per 1,000 in 2008). This is subject to detection by sensitive tests if figures of 2008 and 2012 are compared. It is unlikely for any epidemiological change to occur. Some characteristic behaviours are:

Stereotypy: repetitive movements, as hand flapping, head rolling, or body rocking.

Compulsive behaviour is intended and appears to follow rules, such as arranging objects in stacks or lines.

Sameness is resistance to change; for example, insisting that the furniture not be moved or refusing to be interrupted.

Ritualistic behaviour is associated with no variation in pattern of daily activities, such as an unchanging menu or a dressing ritual.

Restricted behaviour is limited in focus, interest, or activity, such as preoccupation with a single television programme, toy, or game.

Self-injury includes movements eye poking, skin picking, hand biting, and head banging (This is known in some CP children also). A 2007 study reported

that self-injury at some point affected about 30% of children with ASD. An estimated 60%-80% of autistic people have motor signs that include poor muscle tone, poor motor planning, and toe walking.

The National Autistic Society (NAS) UK, champions the interests of all people with autism. It relies on the media to report issues relating to autism in a factual and inoffensive way. The term Autism spectrum disorder (ASD) is most widely accepted. Asperger syndrome is a form of autism. Neuro-typical term, is only used within the autism community so may not be applicable in, for example, the popular press.

Driving? Autism is a spectrum disorder, so it is impossible to say that people with autism either should or should not be allowed to drive. Some people with autism may find this skill extremely difficult to grasp, while others will be highly competent drivers. If you do not disclose your diagnosis at the time of application you could be fined. You could be prosecuted if you are involved in an accident.

In the case of autistic spectrum disorders, barriers to holding a licence might include a history of epilepsy, perceptual problems, difficulties with multi-tasking, poor motor control or dyspraxia and problems with sequencing. These should not be an absolute barrier to gaining a licence but you will need to be aware that they may present difficulties. If a licence is revoked or an application is refused due to medical standards not being met, you will be provided with a medical explanation for the decision. You have the right to appeal against the decision to refuse or revoke your licence to the magistrates court. Although you have a disability, you will still have to take the same test as everyone else and be able to show the same level of ability. However, some drivers with disabilities may be allowed extra time for their test.

People with an autism spectrum disorder (ASD) may be the witnesses or victims of crime. A person is defined as a 'vulnerable witness'; or is defined as an 'intimidated witness', if the quality of their evidence is likely to be diminished because of fear or distress.

> Use of sensitive instruments for early detection of ASD is needed. The professionals other than psychologists dealing with risk babies should be sensitised in this process.

It is believed that there are a number of people with autism spectrum disorders (ASDs) within the prison population. If a person is diagnosed with ASD whilst in prison they will be classed as vulnerable under the Disability Discrimination Act (1995). It is unlawful for prisons to discriminate against people with disabilities.

Only 15% of adults with autism are in full-time employment, but most are willing and able to work. Bullying is similar to harassment. It is when one person, or a group of people, intentionally cause harm to someone else and behave in a way that is deliberately offensive and unkind towards them.

Examples of direct bullying: Rude remarks, jokes or remarks about your disability, insulting you in what they are saying to you or the way they are behaving towards you, overbearing supervision or other misuse of power or position, unwelcome sexual advances - this could be touching you, or standing too close to you while showing or displaying something that you find offensive, humiliating you in front of other colleagues, physical abuse.

Examples of indirect bullying: not being put forward for training or promotion, persistently criticising your performance, setting you tasks or deadlines that you are never going to be able to meet, leaving you out or not inviting you to team social events, spreading malicious rumours about you, making uncalled for comments about your job security when you have been working perfectly satisfactorily; for example, saying that the last person who did your job was fired for not doing the job correctly.

Under the Health and Safety at Work Act, UK 1974, employers have a duty to ensure the health, safety and welfare of their employees. If you decide to tell your employer about your diagnosis, it means that you are protected by the Equality Act 2010.

To sum up it can be said that use of sensitive instruments for early detection of ASD is needed. The professionals other than psychologists dealing with risk babies should be sensitised in this process. Material development for professionals as well as the parents (separately) should be undertaken. The special teachers in the schools need to be involved in the sensitisatioin programme.

It is advisable that bullying needs to be looked into, in schools first since there is policy of inclusive education in our country. Therapists should make the parents also aware. Female students suffering from ASD should be well protected against the sexual advances and misbehaviour.

Other than just schooling, vocational training be included as per need of a student. Even incidence of 1-2% is just below CP and if it is higher it is a pressing situation. Drop outs due to ASD need to be reoriented.

Employment is another big challenge and some stereotype jobs may be handled by them like assembly. It must be remembered that they cannot do executive functions like analysing, planning and coordination due to cognitive problems but other suitable jobs need to be identified in both the urban as well as the rural populations. They could learn something & that must be tried out individually.

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A Snapshot of Autism

A Life full of Care & Challenges

Autism is a term that generates quite mixed emotions and reactions in parents when they first hear it to describe their child's difficulties. Some go into denial, some are confused by what it means, some are angry at themselves, some blame each other and some even blame their child. However there are some parents who see this as an opportunity. An opportunity to parent a child who is challenging and whom most parents would struggle with. An opportunity to really make a difference to someone's life. We can certainly learn a lot from these parents!"

Physiotherapists are often involved with children who have a range of physical difficulties. Some of the children that they see especially those affected with cerebral palsy, muscular dystrophies and encephalopathies may also have additional social & communication difficulties that sometimes fulfill criteria for an Autism Spectrum Disorder (ASD). It's therefore extremely important that they are able to pick up the common indicators of autism and refer these children for a comprehensive assessment. It has also been argued that motor co-ordinations problems are present in ASD to a significant extent, which means that physiotherapists would also have an extremely important role in its management.

History of Autism

Autism Spectrum Disorders (ASD) are a group of related neuro-developmental disorders, characterised by qualitative differences and impairments in reciprocal social interaction and social communication along with restricted interests and rigid and repetitive behaviours. They were once thought to be uncommon with reported prevalence rate of 4 per 10000 in the mid 1960s [1]. The prevalence rates have gone up substantially in the last few decades and a recent worldwide systematic review showed the median prevalence estimate of ASD to be around 62/10000 [2]. The reasons for this rise in prevalence are not entirely clear but it is partly due to changing concepts of autism.

While we see autism as a spectrum of related disorders now, it was a categorical concept until few decades ago. Leo Kanner (figure 1), an American psychiatrist, introduced the term "infantile autism" in a 1943 report of 11 children with striking behavioural similarities [3]. Roughly at the same time, Hans Asperger, an Austrian paediatrician, described a similar pattern of behaviour in four boys [4]. These boys were high functioning as compared to those described by Kanner and were not conceptualized as being similar to autism until in 1981, an English researcher Lorna Wing proposed the condition Asperger's syndrome. She saw Asperger's syndrome as similar to Kanner's autism and subsequently the concept of ASD emerged [5]. By the mid-1990s, two other subgroups were added to the spectrum (atypical autism and pervasive developmental disorder - not otherwise specified) to include similar disorders with a milder severity. Twin studies have also supported the dimensional view of autism [6] and this view is now firmly established.

Leo Kanner who described "Infantile Autism"

Causes of Autism

There is no known single cause for autism, but it is generally accepted that it is caused by abnormalities in brain structure or function. There is a substantial genetic basis with strong heritability [7] around 70-90%.

Multiple interacting genes are involved and potential candidate genes are emerging from the advances in molecular genetic techniques. However, the genetic and phenotypic heterogeneity in autism has made it difficult for rapid advances in this area.

Underlying medical causes are reported in less than 10% of these children [8]. Intellectual disability co-occurs in approximately 50% of children with autism [9] and the rate of underlying medical conditions is higher in children with severe or profound intellectual disabilities. At least 60 different metabolic, neurological and chromosomal disorders have been associated with autism. Some of these are Tuberous sclerosis, Fragile X, untreated phenylketonuria, congenital rubella, neonatal encephalopathy, epileptic encephalopathy, cerebral palsy, muscular dystrophy and neurofibromatosis. A substantial proportion of children with autism have large head circumference and it is thought that this reflects widespread rather than focal brain abnormalities.

Some of the other possibly relevant risk factors include parental age more than 40 years, low birth weight, prematurity, non specific birth complications, presence of birth defects and history of threatened abortion. There have been worries about some vaccines like MMR causing autism, but these have been found to be untrue [10].

Epilepsy and Autistic regression

Autism is associated with a high frequency of epileptiform EEG abnormalities (prevalence range 10.3-72.4%) and epilepsy (prevalence range 0-44.5%) and a significant subgroup of children with autism (20-49%) experience developmental regression [11]. Most cases of autistic regression happen in the first 2 years of life and affects language, behaviour and social skills. While studies have indicated that there might be a significant association between epilepsy and autistic regression; incidental EEG abnormalities, in the absence of clinical seizures, don't appear to play a clear role in autistic regression [11]. The autistic regression also needs to be differentiated from the regression seen in epileptic encephalopathies, which are associated with cognitive regression and often ataxia.

Signs and symptoms of Autism

Autism Spectrum Disorders are characterised by a triad of qualitative differences and impairments in 'reciprocal social interaction' and 'social communication' along with 'restricted interests and rigid and repetitive behaviours'. However, recently, the DSM-V (Diagnostic Statistical Manual of mental disorders - Vth edition) has combined the social interaction and social communication into one subgroup. Onset of symptoms is by 36 months of age. They are three times more common in boys as compared to girls. There is increasing evidence that intensive early interventions can be very helpful in altering the developmental trajectory for a significant proportion of these children [12] and therefore it becomes extremely important to identify the early indicators of autism in the first 2 - 3 years of life.

Triad of Impairments

Early indicators of Autism

Some of the signs and symptoms of autism begin to show in the first year of life but are often missed or dismissed as not significant. The early indicators are essentially the core symptoms of autism that can be picked up early on in the development although their sensitivity and specificity in terms of predicting diagnosis of autism and differentiating from other developmental disorders is not certain. Probably, the best data in this regard comes from a recent study published in the journal "Autism" [13]. Some of the early indicators of autism at specific ages are as below

Age 12 months: Poor or absent

- response to name despite normal hearing
- eye contact
- pointing
- social smile
- imitation
- interest in people
- waving or other gestures

Age 18 months: Poor or absent

- response to name despite normal hearing.
- eye contact
- pointing
- ability to follow pointing (for example instead of looking
- where the other person points to, the child may look at the hand)
- interest in showing things to others to express interest social smile
- ability to use simple gestures like waving, nodding and shaking
- understanding of spoken words despite normal hearing
- interest in other children use of single words despite normal hearing

Age 24 months – All of the above mentioned above would be relevant along with the following

- Inability to follow simple commands
- Little or absent pretend play
- Loss of skills (regression)

Established Signs & Symptoms of Autism

Social & Communication Impairment

Children with autism have a history of speech delay along with poor use of eye contact, facial expression and gestures for social communication and interaction. They also have difficulties understanding verbal and non-verbal language. About 30% of these children may never acquire useful speech and if present it is unusual in quality e.g. use of repetitive, stereotyped phrases. In contrast, children with Asperger's syndrome don't have a history of speech delay but social use of language and non-verbal means of communication are always abnormal.

Children with ASD may have a very literal understanding of language because they find it difficult to understand other people's facial expressions and tone of voice. They therefore struggle with jokes, sarcasms and metaphors e.g., they might interpret the phrase 'It's cool', to mean 'it's a bit cold.'

Children with autism prefer to spend time alone rather than seeking out the company of other people and often don't seek comfort from them. Some may want to interact with others and make friends, but may be unsure how to go about this. They may find it hard to understand the reciprocal nature of conversations and may sometimes repeat what the other person has just said (echolalia) or talk extensively about their own interests. They have difficulty understanding unwritten social rules and act inappropriately e.g., they might comment on someone's physical appearance on their face. It's therefore not surprising that these children are seen as 'odd' and are often bullied.

Children with autism often appear to have a lack of empathy. They have difficulty recognising, understanding & interpreting other people's feelings, thoughts and actions and have difficulty managing their own feelings. They can appear to be insensitive but in majority of cases once they understand the other person's feelings, they can be empathetic. This is different from the lack of empathy seen in people with antisocial traits who are often able to perfectly understand others' feelings but are not affected by it.

Unusual or restricted interests and/or rigid and repetitive behaviours

Children with autism have a preference for routines and sameness as they have difficulty predicting what could happen next. Transition times like moving from primary to secondary school can be particularly difficult.

These children can have a preoccupation with stereotyped interests that are unusual in intensity or quality e.g., an intense interest in train numbers that leads to the exclusion of other more appropriate interests. They can have stereotyped, repetitive motor mannerisms like hand flapping and rocking which they often engage in when they are bored, excited or distressed. Children with autism are often preoccupied with part objects rather than whole objects e.g., rather than being interested in their toy car, they may only be interested in its wheels which they may love to spin and watch repeatedly. Their play is generally very repetitive with little imagination. When they do engage in imaginative play, they often act out the same scenes in a repetitive manner.

Sometimes children with autism display unusual sensory interests in that they may have an intense interest in how a certain object feels, smells, tastes or looks like. They may want to touch other people's hair or cheeks or carry certain things with them which they may want to touch, smell, stroke or look at repeatedly. Sometimes, these children may also have unusual fears or aversion towards certain sensory stimuli e.g., textures, sound and smells of things. This sometimes applies to food, which can seriously restrict their diet.

The symptoms described above need to be present in the early developmental period and cause clinically significant impairments in social, occupational and other important areas of functioning.

Other symptoms

Although not core features of autism, sometimes these children have difficulty understanding the concept of danger e.g., they may run on to a busy road. They can be clumsy, hyperactive and aggressive and can have severe tantrums.

A recent meta-analysis [14] concluded that ASD is associated with significant and widespread alterations in motor performance. The authors also found that the motor impairments were seen on a spectrum and individuals diagnosed with autism had greater impairments than those found in ASD or Asperger's syndrome. Based on their findings, they argued that motor deficits are a potential core feature of ASD, and that treatment of ASD should consider including interventions aimed at improving motor performances involved with motor coordination (i.e., gait and balance, arm functions, and movement planning).

Diagnosis of Autism

There is no specific test for autism and diagnosis is made on the basis of presence of characteristic behaviours (described above) according to prescribed criteria that are used internationally. It's important that these children are picked up early and referred to skilled professionals for comprehensive diagnostic assessments.

A full assessment should ideally be carried out by a multidisciplinary team that comprises of a developmental paediatrician and/or child psychiatrist, a speech & language therapist and a clinical psychologist. In the absence of a skilled team, a child psychiatrist or a developmental pediatrician would be best placed to make a confident diagnosis.

The assessment process includes a detailed history with information elicited ideally from multiple sources (parents and school), a direct assessment through interaction with and observation of the child and a physical examination. It's important to ensure that the child has normal hearing and vision. The assessment takes into consideration various possible differential diagnoses that can present similarly to autism.

An assessment of cognitive functions is sometimes done as part of the assessment. Structured tools like Autism Diagnostic Interview (ADI) and Autism Diagnostic Observational Schedule (ADOS) are extremely reliable and valid and can be used to make the assessment more objective especially in children with borderline difficulties. The aim of the assessment is not just to make a diagnosis but also to create a profile of the child's strengths, skills, impairments and needs that can be used to create a needs-based management plan.

In most cases, no specific tests are needed. However, genetic testing, EEG, neuroimaging (preferably MRI brain scan), blood and urine tests may be considered if there is a specific clinical indication.

NB: The terms 'Autism' and 'Autism Spectrum Disorders' have been used interchangeably in this article.

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Role of Physio Therapist in Autism

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ASD is a Neuro-developmental disorder characterized by impaired social interaction, impaired communication skills and repetitive or stereotypical behavior. Past few decades have shown increasing incidence of ASD. At present 1 out of 110 children in India are diagnosed to have ASD [1]. Why do these children develop this complex developmental impairment is not understood. There are various theories explaining the possible mechanisms, but they are speculative with limited evidence. As the cause of ASD is still unknown, the management strategies are evolving everyday with new discoveries about the manifestations of ASD. Traditionally 'ASD' is presumed to be synonymous with behavioral, sensory and perceptual abnormalities. As soon as a diagnosis of ASD is confirmed the parents are advised to consult a range of rehabilitation professionals like occupational therapist, speech therapist, psychologists and special educators.

However management of 'ASD' should not be limited to these. Slowly as the understanding of the disease is growing various studies have identified motor and physical impairment. But in the presence of gross behavioral and sensory manifestations the motor symptoms are often overlooked. Various multidisciplinary rehabilitation centers in countries like USA, Australia and United Kingdom have physiotherapy as an integral part of their early intervention team for the management of ASD. These physiotherapists also undergo specialized post graduate training in treating children with ASD. Our aim is to make the physiotherapists all over India aware that we too have a role to play in the management of ASD. We hope this article to be a portal for the physiotherapists to enter the world of these wonderful children.

What are the motor and musculoskeletal impairments in ASD?

Movement is an integral part of our social, emotional, and physical lives. A four month old baby excitedly kicks her arms and legs in response to any pleasant stimulus or a 7-8 months old toddler will crawl to retrieve her favorite toy, shake it to hear the sound it makes. As the child grows the length and complexity of movement sequences becomes more sophisticated and planned. But unfortunately children with ASD often cannot coordinate the myriad of movements needed to complete these interactions.

Although sensory processing deficiencies and behavioral abnormalities are profound in ASD, various motor abnormalities have been identified by various researchers in the last decade [2,3,4]. Movement initiated in response to internal of external sensory stimulation requires integration of multiple sensory inputs and organization of the responsive motor outputs. Neuroimaging studies have suggested neural connectivity deficits in ASD [5], which may contribute to the deficits in the integration and organization of various neuronal responses.

ASD shows less activation in cerebellum with relatively more activation in the fronto-striatal region [Mostofsky, 2009]. Evidence also now suggests that aspects of cerebral morphology are also different in people with ASD, which including both volumetric (i.e., cortical thickness, regional area) and geometric (i.e., cortical shape) features [Levitt, 2003 & Wu Nordahl, 2007] and that different morphological features may have different neuropathological and genetic underpinnings [Panizzon 2009].

Shetreat-Klein et al 2012 [6], studied the motor abnormalities in children with ASDs.

The findings were synonymous with the early findings [2,7,8] showing gait deviations in children with ASDs as compared to their age matched non-ASD peers. Using retrospective video analysis, Esposito et al 2011 showed that ASD group had differences in gait pattern, i.e., postural asymmetry; atypical foot movement, arm movement, and generalized movement.

Earlier reports suggested a "parkinsonian gait," characterized by longer stance duration, shorter stride lengths, lack of a heel-toe pattern, and reduced upper-limb movement [Vilensky, 1981]. In contrast, recent reports identified features of "ataxic gait," characterized by instability, as observed in reduced range of motion at the ankle and increased variability of stride lengths [Hallett, 1993].

Movement is an integral part of our social, emotional, and physical lives. A four month old baby excitedly kicks her arms and legs in response to any pleasant stimulus or a 7-8 months old toddler will crawl to retrieve her favorite toy, shake it to hear the sound it makes. But unfortunately children with ASD often cannot coordinate the myriad of movements needed to complete these interactions.

In addition they also identified a delay of 1.6 months in achieving the motor milestone of walking and clinically as well as statistically significant increase in the passive range of motion of multiple joints suggestive of hypermobility of the joints.

Using the Bruininks-osertsky test of motor proficiency, it was found that children with ASD have problems with running speed and agility, motor planning, bilateral coordination, visual motor coordination, limb strength, static and dynamic balance [9]. One in every five children suffering from ASD is found to have generalized hyper mobility of the joints and low muscle tone [10]. Contrary to the earlier views that children with ASDs have normal motor development and performance, various researchers have observed deficits in motor co-ordination [11], postural stability [12], motor planning and performance [13].

The ability to use gestures and motor imitation relies on motor activity to communicate with others.

Interestingly, children with ASD have difficulty with communication as well as difficulty using motor activity (e.g., gestures and imitation) as forms of communication to support social interaction.

Motor imitation has been identified as a significant impairment in previous literature on individuals with ASD, particularly in relation to social communication.

In a literature review by Williams et al, 2004 the authors suggested that imitation impairments are present in children with ASD and are more apparent in younger age groups (below the age of 4 years) when compared with other children. Stone et al 1997 suggested that imitation impairments in children with ASD are due to a delay in acquiring imitation skills, rather than disordered sequencing.

Postural control requires a level of stability necessary prior to executing additional motor skills or activities. Without this control, motor activity may be limited to more static positions. Individuals with autism tend to have decreased postural control [Minshew, 2004 & Schmitz, 2003]. Individuals with autism have decreased postural stability, particularly in circumstances where there is sensory conflict. Children with ASD demonstrated increased sway, abnormal weight distribution, and the absence of typical ankle strategies in standing. A "paradoxical stress response" was noted in individuals with autism, indicated by an increase in postural stability in stressful conditions (defined as removal of vision) [Kohen-Raz, 1992].

It is important to understand that motor impairments can lead to great difficulty in adjusting to physical environment, fine motor skills like writing, tying shoe lace or buttoning. Motor deficits in these children may be detected late in their lives or may go undetected. Researchers have stressed on early detection and intervention of these impairments.

How to identify the motor and musculoskeletal manifestations in children with ASD? [14,15]

Motor Impairments or Delays	Impairments in School - Aged Children & Adults With ASDs	Delays in Infants at Risk For ASD & in Toddlers & Preschoolers with ASDs
Gross motor coordination	Poor upper-limb & lower-limb coordination, including bilateral coordination & visuomotor coordination	Gross motor delays in supine, prone, sitting skills are present in the first year of life. Delayed onset of walking may be present in the second year of life. Gross motor delays are also present in preschoolers recently diagnosed with ASDs.
Fine motor Coordination	Poor fine motor coordination such as in performance on manual dexterity tasks (e.g. Purdue Pegboard Test)	Reaching & grasping appear to be delayed in infants at risk for ASDs. Fine motor delays persist in the second & third years of life.
Motor stereotypies	Motor stereotypies are common in older children & adults with ASDs.	Motor stereotypies such as repetitive banging of objects or unusual sensory exploration may appear in the first year of life, but most often emerge in the second year of life.
Postural	Feedforward & feedback control of posture are affected in children and adults with ASDs. Overall deficient postural control persists in adults with ASD.	Delays are evident in postures such as rolling and sitting. There are suggestions of unusual postures held for brief to long periods in infants who later developed ASD.
Imitation and praxis	Imitation impairments are present during postural, gestural & oral imitation. Performance of complex movemet sequences is poor during imitation, on verbal command, and during tool use, suggesting generalized dyspraxia not specific to imitation	

The classification below shows various signs and their clinical Presentations.

- **Low muscle tone**
  Clumsiness
  - Avoids physical activities like running-jumping & hopping
  - Arms and legs dangle loosely when a toddler is picked up and moved
  - Frequent falls
- **Poor coordination and balance**
  - Tripping over their feet
  - Frequent falls
  - Difficulty learning complex motor tasks
  - Difficulty in executing movements in sequential pattern
  - Bumping into objects
  - Slowness in completing the activities
  - Poor single leg balancing
  - Poor catching and throwing
- **Postural deviations**
  - Lordotic posture while standing
  - Kyphotic posture in sitting
  - Protracted shoulders
- **Muscle weakness**
  - Scapular winging
  - Hyperextension of the knees
  - Reluctance to lift heavy objects
  - Easy fatigability
- **Muscle tightness**
  - Neck flexors
  - Pectoral muscles
  - Hip flexors
  - Tendo Achilles
- **Generalized hyper mobility of joints**
  - Flat feet
  - Hyperextension of elbows and knees on passive movement
  - Poor posture
  - Inability to maintain a correct posture for a longtime

How to adapt the components of physiotherapy evaluation to suit the unique challenges of children with ASD?

Observation is the key in the assessment of children with ASD. The physiotherapist may need to assess the child over multiple sessions to identify the motor impairments. Sometimes these children may have altered response to pain. They may not respond to incentives, neither may fear the punishments. During physiotherapy evaluation a child's neuromuscular and musculoskeletal systems are assessed. The therapist closely looks at child's ability to take in sensory input and control motor output. They assess the facilitating and limiting factors for different gross motor skills like walking, jumping and running, stair climbing, and kicking a ball. Through play, the therapist should observe how a child uses his balance reactions and protective reactions. How the child plans motor skills and strategizes to move in and out of different positions. The therapist should also observe the child's posture in a variety of positions, and how the child's posture affects breath control, oral motor control, and vocalizations. In addition a routine examination of muscle strength, muscle length and range of motion should be undertaken.

How can we help treat these impairments?

On the basis of evaluation, the frequency of the sessions (everyday, alternate day or twice in a week) and child's therapy sessions are planned. Children with predominant motor and sensory deficits may initially need session's every day. Children with who are only found to have issues like poor coordination and coordination may need session twice/thrice a week. Home program is very essential, as these exercises need a lot of repetitions. So parental education is a must. Proper planning is very essential before planning a therapy session .The key things to remember before planning a session is make sure it is fun, easily achievable for the child, should not be very easy, variety of activities should be chosen. As we all know children with ASD have difficulty in communication. It is advisable to use more visual clues than verbal instructions.

Use picture cards or mirror to demonstrate the movement. Therapy session could be divided into three parts. First 10 minutes of the session to be utilized for planning according to child's mood and orientation. Next 30 minutes to give exercises like muscular strengthening, coordination and balance exercises and stretching. Next 10 minutes should be used to calm the child either by using any play therapy or parental counseling.

In addition to active physiotherapy session an aerobic endurance activity like walking, running, jogging, cycling, jumping, bouncing and dancing should be incorporated and performed for 20 – 30 min / 3 -5 times a week.

Fig. 1: Balance exercise (single leg balancing)

Fig.3 Strategies used to improve motor planning

Fig. 4: Balance exercises

Fig. 8: Core muscle strengthening

Fig. 7: Endurance exercises

Fig. 5 Teaching strategies, use of mirror or demonstration by a parent

Fig. 6 Parental help to demonstrate ball pushing to strengthen trunk muscles.

Fig. 2: Ball throwing and catching to improve coordination with balance training.

Fig. 9 : Strengthening and stretching of neck muscles

Various strategies could be used to teach & execute these activities to children with ASD. Parent / caregiver involvement in the exercise is very important. Demonstration of a particular activity/ movement by parent/ caregiver; using visual and auditory to cues to perform the activities are some of the strategies that physiotherapists could adopt.

The picture collage on the left shows various strategies used in executing the therapy session – use parents or care givers to teach the movement

What are the potential benefits of physiotherapy for children with ASD?

Although several motor impairments have been identified; the patterns, sources and the causality remains poorly understood. It was believed that the motor symptoms could be corrected when the sensory and perceptual deficits are addressed; but it is intriguing to see the effect of physical intervention on various symptoms in ASD. Oriel et al. 2011, found that 15 minutes training with aerobic activity in children with ASD significantly increases the performance in the classroom task [16]. Physical intervention through aerobic activities and strength training reduces the self stimulatory behavior [17], repetitive motor behaviors [18,19], improved social behavior and classroom performance [20]. In the view of these benefits of physical intervention, physiotherapy has been integrated in the clinical framework for treating children with autism[21].

Physiotherapy helps to improve postural control to increase stability during fine motor, gross motor, and self-care activities. Improve static balance to improve motor control and attention and decrease impulsivity. Learn to perform the ideation, sequencing, timing and execution components of motor planning. Maximize sensory processing and organization skills to put into controlled motor skills. Lay down the foundations of gross motor skills to support participation in community and peer activities. Physical exercise has Calming and relaxing effect.

Recently different treatment modalities like aquatic therapy have also been used by physiotherapist for the treatment of ASD. Aquatic therapy helps to improve body awareness, coordination, muscle tone, and to reduce tactile hypersensitivity; it also provides vestibular stimulation and is therefore being explored widely.

To conclude, children of all ages learn through movement and need to master core motor skills in order to maximize their overall potential. Beginning as infants they develop stability so that they can learn to use their hands and feet independently from the rest of the body. They also learn how to manipulate the environment and how to move their bodies within it. They use movement to bond and communicate with others and to explore the world. Limitations in motor skills can lead to difficulty with all areas of development. Physiotherapy can be a beneficial part of a team approach to help children with ASD to be as successful and independent as possible in school, home and in the community.

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Effects of Exercise on Stereotypical Behaviors in Children with Autism Spectrum Disorder

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The First Systematic Review

In 2008, five of my former master's in physical therapy (MPT) students at the University of British Columbia and I published a qualitative systematic review examining the effects of exercise-related interventions on stereotypic behaviors in children with autism spectrum disorder.1 We searched the literature back to 1980 but, at that time, there were only seven studies that met our inclusion criteria and those studies (mostly case reports or single-subject research designs) involved only 25 children.

The levels of evidence and methodological rigor of those studies were quite low, thus limiting the validity of our conclusions. Nonetheless, we were able to state that exercise provided "short-term reductions of stereotypic behaviors in children with ASD."1, p 134 We went on to suggest that future studies should be more rigorous in design with higher evidence levels and should be directed at looking at longer term outcomes.

So what is ASD?

One of a number of neurodevelopmental disorders, such as cerebral palsy and developmental coordination disorder, ASD affects far more boys than girls (4:1 ratio) and appears to be increasing in prevalence such that it is now identified as one of the more common developmental disabilities.1 Stereotypic or repetitive behaviors, e.g., hand-flapping, spinning toys, rocking, are one of the hallmarks of ASD1 and can interfere with age-appropriate social interactions and activities of daily living.

How then could exercise contribute to decreasing stereotypical behaviors in children with ASD?

In 2002, Baranek postulated that aerobic exercise could modify such behaviors through the release of neurotransmitters.2 Other authors have speculated that increased physical exertions resulting in fatigue might minimize the occurrence of inappropriate behaviors, such as stereotypies, in children developmental delays.3

The Latest Systematic Review/Meta-analysis

Fast-forward now to 2012 and the publication of a meta-analysis examining more generic effects of exercise (on motor, social and communication functioning) involving 16 studies that included 133 participants, both children and adults, with ASD.4 Among these 16 studies were four that examined the effects of exercise on stereotypic behaviors – included by the authors among the "motor outcomes" assessed. Three of the four studies used jogging as the intervention with the fourth employing swimming; only 13 participants were included in these studies, six of them adults. Decreases in stereotypic behaviors ranged from 29% to 100% across the four studies. Interestingly, these authors4 uncovered one 2004 study that we had missed in our own systematic review but failed to identify five other studies examining the effects of exercise on stereotypies that had been included in our review1 – three because they included only studies published after 1990 but two (published in 1993 and 2003) that they apparently missed altogether.

When examining all outcomes involving motor functioning, the authors reported a mean improvement for the participants who received exercise of 40.4%, with greater improvement in those who received individualized (48.4%) vs. group-based interventions (36%).

Update on Current Research

The same year as the publication of this recent systematic review/meta-analysis,4 another study was published that examined the effects of a type of martial arts, known as **Kata**, on stereotypical behaviors in children with ASD. In this quasi-randomized controlled trial, 30 school-aged participants (ages 5 to 16) were first matched into pairs by age, gender and severity of autism and then randomly assigned into an exercise or control group.5

Kata is a form of exercise practiced in karate that is structured and involves a number of movements in each set. In this study, Kata involved having the participants in the experimental group learn individual hand and foot movements, basic stances and basic kicking techniques, eventually progressing to the use of stepping punches and blocks.5

Using the stereotypy subscale of the second edition of the Gillam Autism Rating Scale as the outcome measure at baseline, completion of the 20-hour Kata program (14 weeks later), and at a later one-month follow-up, the authors reported a significant decrease of 5.33 points, i.e., fewer stereotypical behaviors, in the exercise group but no significant change in the control group (a decrease of only 0.53 point). At the one-month follow-up testing, there was a slight but non-significant increase for the exercise group and a slight but non-significant decrease for the control group – each as compared to the post-intervention assessment.

Kata is a form of exercise practiced in karate that is structured and involves a number of movements in each set.

The benefit accrued to the experimental group by engaging in the Kata program was a 42.5% decrease in pre-intervention levels of stereotypies, certainly a clinically important difference. Furthermore, that decrease was essentially maintained at 1-month follow-up suggesting that the intervention had prolonged effects even after it had been stopped.

Summary

In summary, there is consistent evidence that physical exercise can reduce stereotypic behaviors in children with autism 1,4,5 Although the studies included in the two systematic reviews had very small samples sizes, 1,4 the recent study of Kata as the intervention had a reasonably healthy sample of n = 30 and used a fairly rigorous design.5

Physical therapists who work with children with ASD should consider using physical exercise as a strategy for reducing the stereotypies that may be interfering with these children's learning, socialization and communication. Although the average pediatric PT is likely not familiar with Kata exercise, other types of interventions to try could include jogging (outdoors or on a treadmill), swimming, or playing ball.

In addition to the beneficial effects of decreasing stereotypic behaviors, physical exercise has been shown also to enhance cardiorespirator endurance, muscle strength, motor skills, social motivation, aerobic fitness, academic behavior and, most importantly, quality of life in children with ASD.4 Working collaboratively with school-based physical education (PE) teachers to incorporate such programs into the children's regular PE classes and working with parents to encourage their children to become more aerobically fit would be two strategies that might result in lasting benefits for these children.

Physical therapists who work with children with ASD should consider using physical exercise as a strategy for reducing the stereotypies that may be interfering with these children's learning, socialization and communication.

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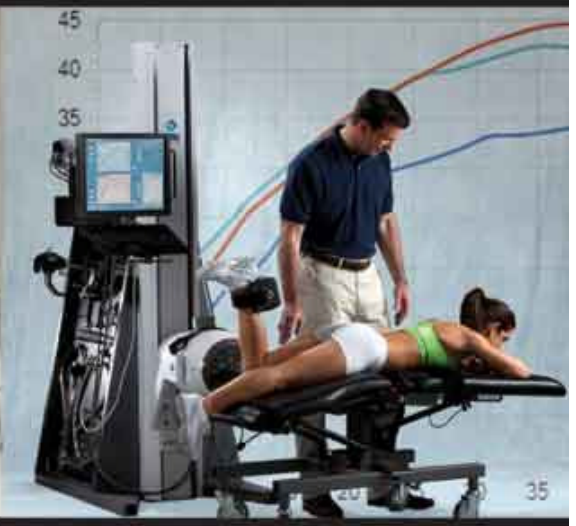

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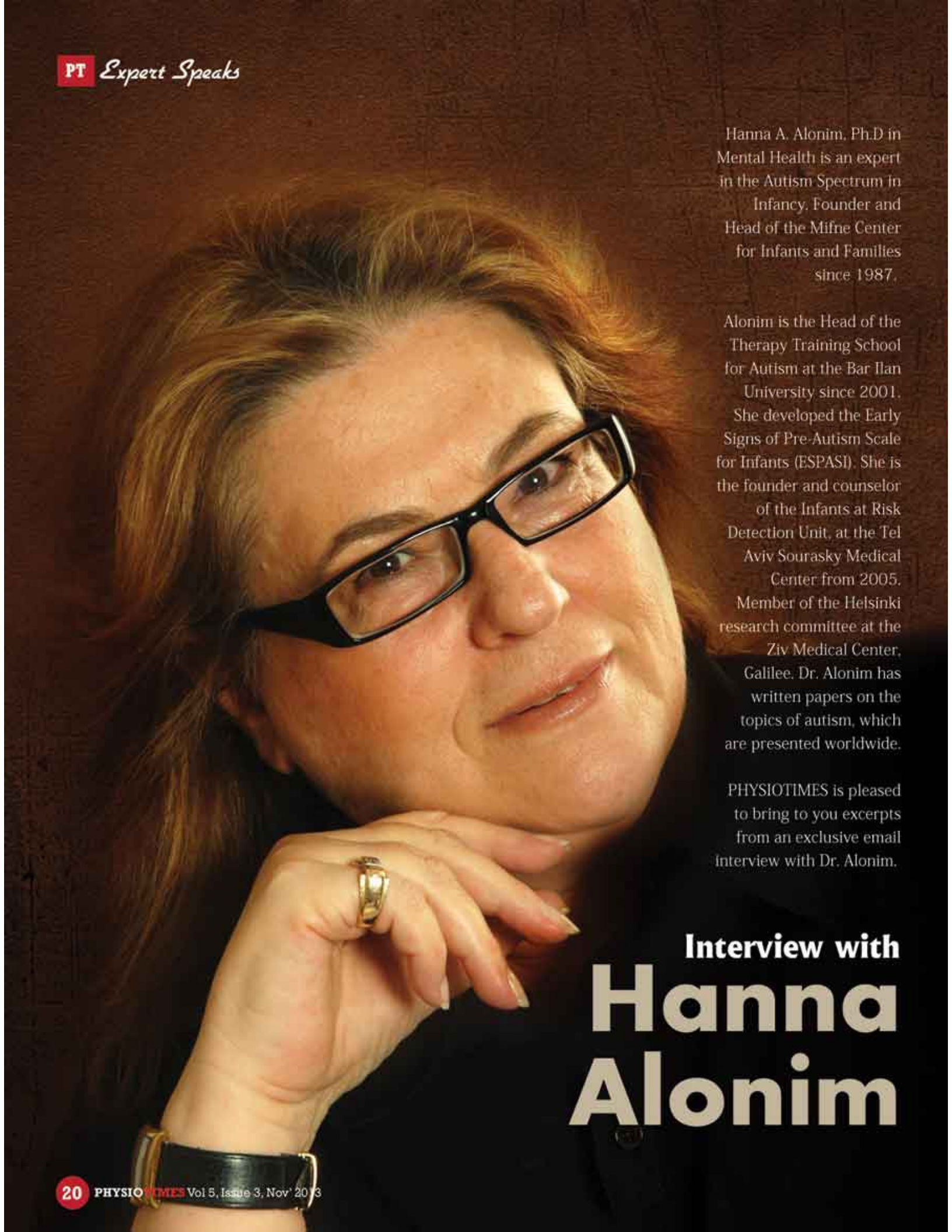

Hanna A. Alonim, Ph.D in Mental Health is an expert in the Autism Spectrum in Infancy. Founder and Head of the Mifne Center for Infants and Families since 1987.

Alonim is the Head of the Therapy Training School for Autism at the Bar Ilan University since 2001. She developed the Early Signs of Pre-Autism Scale for Infants (ESPASI). She is the founder and counselor of the Infants at Risk Detection Unit, at the Tel Aviv Sourasky Medical Center from 2005. Member of the Helsinki research committee at the Ziv Medical Center, Galilee. Dr. Alonim has written papers on the topics of autism, which are presented worldwide.

PHYSIOTIMES is pleased to bring to you excerpts from an exclusive email interview with Dr. Alonim.

Interview with Hanna Alonim

1 ***In the recent past, public perception towards autism have changed significantly. What have been the main developments as a result?***

In the early 1980s the International Autistic Society estimated 2 cases of autism per 5000 children. The widening of the definition of Pervasive Developmental Disorder in the DSM-IV (1994) led to an increase in identified cases on the autism spectrum (especially Asperger's) to an estimated frequency of 2 cases per 1000 children. Children were not diagnosed before school entry. New understandings regarding autism has recently changed significantly, leading to three major developments: *increased awareness of the phenomenon of autism, improvement of diagnostic tools and a significant lowering of the age of diagnosis.*

Substantial funds have been invested in research on autism, and findings indicate the influence of genetic factors associated with environmental aspects. The basic assumption is that as the population grows, new mutations emerge in the human gnome, contributing to the development of the autistic syndrome. However, it is still not possible to isolate and distinguish genetic, environmental and neuro-developmental factors.
In 2012 the prevalence of identified autism reached worrying dimensions with reports estimates of one case per eighty children (1:80) in the USA, one per 200 children (1:200) in Europe. However, we can't ignore the fact that there appears to be some tendency to over-diagnosis, mainly in the USA.

2 ***What were the missing links and essential components you found in the treatment framework for children with Autism that needed change?***

From 1972-1987, I worked as a therapist with children with communication disorders, diagnosed as autistic, usually aged six or seven. During that pre-internet age, due to lack of any clear understanding of autism, and little international communication, there was no conception of early intervention in autism, nor was there recognition of the need for family therapy in this field. Yet, I gradually concluded that the treatment of children with autistic symptoms should include the following essential principles :

a. The children's age: starting treatment at age six made it difficult to achieve significant changes since the children had already established characteristic patterns of behaviour. This observation was later supported by a large body of literature. However, reducing the age of diagnosis required a tough process with the relevant authorities.

b. Intensity: After many years treating children with autism I noticed that they usually failed to transfer what they experienced in one treatment session to the next, and treatment achievements were not carried over to affect their routine behaviour. I therefore decided to work intensively with each child for a few hours daily.

c. Family therapy: Since the family constitutes the extrinsic environment that influences their child, they are the ones, who have to cope with the child's difficulties on a daily basis. Therefore, a child's treatment should involve the entire family. Those conclusions led to the development of the Mifne Method in 1987.

3 ***Mifne in Hebrew means 'turning point'. Could you tell us more on how it proved to be a real turning point and how did the Mifne concept evolve?***

The Mifne Intervention Programme is a sequential family programme for infants up to age two with a diagnosis on the autistic spectrum. This model of early intervention for children with autism was the first to recognise the importance of individual intensive treatment and parental participation. This is a multi-component intervention programme that addresses key issues relating to environmental aspects: particularly the family. The guiding concept of the programme is, that whatever the aetiology is, autism affects the whole family. Therefore, family therapy is an essential component of this intervention programme.

The Centre provides a near-naturalistic environment, facilitating everyday life for the whole family. The initial short-term therapy aims to give the family the opportunity to reflect upon themselves and their child, to gain a better understanding of their needs. It identifies the nuclear family, as the focal point for treatment. For many years, autism has been considered as a lifelong syndrome. Today, we know that treating the infant at a younger age, produces better results. Many families from all over the world have been given new hope and benefitted effectively from this novel concept of a thorough and comprehensive family program.

4 ***Please tell us about the Mifne Intervention Program and the practice principles that you employ.***

The basic concept underlying the therapeutic model views the family as an organic unit. The nuclear family takes an active part in intensive treatment, beginning with a residential period lasting three weeks, all day, seven days a week at the Mifne Centre. The programme applies Bowlby's (1969) attachment theory, relating to the development of the self through the development of play.

It incorporates psychodynamic concepts regarding autism introduced by Tustin (1981) and the systemic approach to family therapy of Minuchin (1978), and adopts a bio-psycho-social model. The Treatment Program focuses on all components of the baby's development: *physical - sensory - motor - emotional - cognitive aspects* ***through Reciprocal Play Therapy***, a method developed at the Mifne Centre to motivate the improvement of the infant's abilities to engage and communicate with the environment out of curiosity and pleasure.

The program includes three stages supervised by Mifne therapists:

1. Intensive therapy for the nuclear family at the Mifne Centre
2. Aftercare therapy at home
3. Integration of the child in a kindergarten

5 *Who all are a part of the Mifne therapeutic team and how are their roles defined to ensure proper team work ?*

The therapeutic staff includes experts from the fields of medicine, psychology, psychotherapy, family therapy and infant development, all specially trained to work with the Mifne approach. Since we focus on each family individually, the therapists are in daily attendance at the Centre, to provide maximum containment to each family member. This allows a constant flow of information, supplemented by therapists' team meetings and peer feedback sessions, to help them analyze and empower their personal and professional skills. The Mifne Intervention Programme calls for a high competence level, self-awareness, insight, much creativity, improvisation, sensitivity towards others and empathy. The therapists are highly skilled in observation and analysis of therapeutic situations. Their training is an ongoing process.

6 *What in your opinion is the role played by physiotherapists in the overall management of Autism?*

Motor difficulties play an intrinsic part in the phenomenon of autism, and identification of these difficulties can be used to diagnose autistic traits in the first few months of life. Motor development should be carefully watched: does the baby roll over; crawl; stand; walk at appropriate development times. In many cases there is also some degree of hypotonic tension. Studies claim there is evidence for a motor disturbance already in the baby's first months (Teitelbaum, et al., 1998). In recent research on movement in a few days old mice, Horev (2012) supports this assumption; he claims that in typical motor development the mice spread out four limbs to form a stable support base, while mice with inappropriate development who lacked Chromosome P16 (noticed in 1% of children with autism), had a different motor phenotype, contracting their arms and lying on an unstable support base. Taking this knowledge into consideration, physiotherapists may have a major role in the diagnosis process for infants displaying motor disorders or motor delay. At the Mifne Centre we use Hydrotherapy in the treatment of infants.

7 *What is the key difference between Mifne Program and other existing interventions in Autism such as ABA, DIR and others?*

It is interesting to note that most programmes for infants diagnosed with autism were developed in the late 1980s, and were implemented independently in various countries before Internet developed. Treatment methods were only published much later. New understandings and the increased diagnosis of autism led to the development of different approaches. The ***TEACCH*** and ***PECS programmes***, are educational models, implemented mainly in schools. ***ABA*** is a structured behavioural model, used in both homes and schools.

The ***Son-Rise programme*** uses an interactive approach, implemented at home, and ***Floor-time/DIR*** is a developmental, relationship-based model, also implemented at home. Yet, all the above programmes guide parents according to specific methods, but do not involve the parents and siblings with their own therapy. Moreover, most of them focus on the child's symptomatic behaviour, meaning that they lack a holistic approach, taking into consideration all the aspects of the child's development: the level of their emotional, cognitive and physical development; of their attachment and 'self-awareness'; eating and sleeping habits; motor skills; play, speech and 'other-awareness'. The Mifne program is designed for very young infants and this is our main expertise. This model of intervention includes all the above-mentioned aspects, and their inclusion differentiates this model from other programs.

8 *You developed the screening scale ESPASI for the identification of early signs of autism in infancy. Could you tell us more.*

Many parents report; "until age one my child developed properly and then there was a regression." *What happens at that significant cut off point between the first and second year of the infant's life? Does the clinical picture really change?*

A retrospective study conducted at the Mifne Centre over the last decade examined 110 infants diagnosed with autism at the age of 2-3 years, using retrospective analysis of parents' video-recordings of their first year of life. Findings indicated that 89% of the studied infants originating from different cultures, exhibited signs associated with autism characteristics during the first 15 months of life. These findings affirmed the assumption that symptoms of autism frequently appear in the infants' first year of life, indicating the urgent need to identify risk for autism at this early stage. Following this and other studies, we developed a screening tool to identify infants at risk.

The ESPASI scale includes eight variables: investigated in the above-mentioned study that may point out a risk for autism: 1. *Over-passivity; 2. Over-activity; 3. Lack of eye contact; 4. Lack of reaction to parents' presence; 5. Resistance to eating; 6. Withdrawal from parental touch, 7. Delayed motor development; & 8. Rapid head circumference growth* (Courcshense, 2003). This scale is now used in various medical centres.

9 ***What are the various issues that a family and parents with an autistic child face?***

The family is more than the sum of its parts. It has characteristics that emanate from constant interaction among its members (Minuchin, 1978). Various components form a family structure: family genetics, traditions, beliefs, myths, state of health, mental state, work characteristics, socio-economic status, parents' life experiences, parents' personality, positions in the family, and expectations for the child from the nuclear and extended families. Transition to parenting is a major life event, generating normative pressure. This process is accompanied by various expectations for the ideal child, alongside anxiety in facing the unknown and the need to recreate equilibrium in the family (Bollas, 1987).

A child with a disability may upset the state of equilibrium in the family, both at its birth and later, when developmental disorders are diagnosed. Lack of feedback from the baby might cause the parents to feel a sense that they have failed as parents, both individually and as a couple. Parents of a child with autism often undergo conjugal crises that sometimes threaten the child. Parental 'togetherness', that integrated philosophy of life, transmitted to the children until now, has been breached and undermined. In many cases, families adopt a style of ambiguity, impeding family communication and causing confusion. Confusion might increase the emotional detachment of the infant. Parents find themselves in a state of stress and seek help.

> One needs much empathy, curiosity, patience, belief, knowledge, modesty and hope, in order to reach a detached child who is often led by his own anxieties and difficulties to understand the environment, but at the same time over sensitive to sounds, lights, touch, smell and human behaviour.

10 ***In your opinion, therapists, are merely a bridge helping parents achieve their goals. How do you accomplish this collaboration with parents at Mifne?***

The main factor that usually brings a family into therapy are the symptoms of one family member, the Identified Patient (IP), representing the 'weak' member in the family and occupying a central place in the family's daily life. The work with the parents aims to enhance their ability to achieve an insight into themselves, to understand their own behaviour as an outcome of their self perceptions, and as a part of a role dictated by their family ideology.

The Mifne method uses clinical meetings, verbal and non-verbal communication, individual and couple meetings, family sessions, feedback and team consultation for the parents. In order to clarify their use of "unknown thought" (Bollas, 1987): what you do is based on what you know, but are not always aware of, parents are asked questions:
e.g. How do both of you feel in encounters with your child? How do you cope with this experience? What do you do with these feelings? What have you been doing up till now? What have you not done? What would you like to do? Why? This clarification enhances their ability to listen to and understand each other, and creates a supportive environment, to help their child thrive.

11 ***Why did you feel the need to include siblings in the treatement?***

One of the first families treated at Mifne had two children - the younger one, the identified patient (IP) was three years old, and his elder brother was seven years old. At that time, much attention was given to the IP and his parents, but the elder brother was left somewhat in the background. One day, the seven-year old whispered in my ear: "I want to tell you a secret, but you mustn't tell anyone..." I promised to keep the secret, then he continued: "I also want to be autistic." "Why?" I asked. "Because then mummy and daddy will have time for me and I'll also be allowed to do whatever I want..." From the words of this child, conveying a feeling of distress that is not always apparent, it became clear that there was an urgent need to include siblings in the treatment.

This is a universal pattern: very frequently, siblings are not given much attention since, naturally, the parents invest most of their time and resources in their special child. Sometimes when there are twins and one of them is the child with autism, the other twin gradually becomes his 'shadow'.

Quite often, siblings suffer from various emotional, behavioural or learning problems, but they do not receive sufficient attention. At the Mifne centre, siblings are always integrated in the family program according to their ages and personal needs. Very young siblings are treated by experienced therapists via play, some sessions combine sibling-IP play methods. Older siblings may enter into verbal conversations as well, to explore their difficulties. Very often it is possible to see new channels of communication created among siblings who receive intensive support to empower their self-confidence and interpersonal relationships. Every year, siblings of children who have been treated at the centre, attend a support group at a Mifne summer camp.

12 *Could you tell us about Reciprocal Play Therapy and its various stages and what are the main benefits of this approach?*

Play has a great impact on the child's entire life and will influence their social, emotional and learning capabilities. Treatment for the infant is based on Reciprocal Play Therapy (RPT) developed at the Centre, which helps the baby to discover the pleasure of the self and human contact. RPT aims to engage the baby by easing them into the experience of social interaction as a source of pleasure, by encouraging them to feel the comfort of unconditional acceptance, enabling the growth of trust and stimulating the baby's motivation to engage in social interaction. The play concept involves three levels simultaneously:

Sensory Play (SP) - the caregiver sensitively touches, hugs, massages or carries the baby and tries to comfort their body. This is the seed from which trust in the pleasure provider grows.

Tempted Play (TP) - the caregiver talks, sings, provides a toy, plays hide-and-seek and other games and motivates interaction, allowing the baby space to initiate and respond with a look, babbling, or a smile.

Cognitive Play (CP) - the caregiver focuses on the development of basic skills such as looking for a toy, putting a block into a box, feeding a doll, strengthening gross motor skills which influence cognitive development. This process is intended to be an empowering experience for the baby, building their self confidence, which is the basis and essence of their life development.

13 *While the Mifne Model works mainly on early intervention for children with autism, what is the likely course of action for those children who are diagnosed later than 3 years of age?*

Children over age three usually attend special education nursery schools, receiving therapy sessions in these frames. However, these systems don't involve the family. I believe that every child can progress within a good therapy system, but infants under the age of two have greater probability to significantly enhance their childhood development.

14 *90% of children diagnosed on the autism spectrum suffer from eating disorders. How does the Mifne method handle this aspect?*

Most children with autism display eating disorders. Feeding problems in children with autism range in severity from sub-clinical levels to clinical extremes that can engender severe medical conditions. Most of the eating problems in children with ASD can be categorised as behavioural feeding disorders and sensory-based feeding problems. Because of the interaction of the primal instinct of the need to eat with elements of interpersonal communication involved in the eating process, basic anxieties may be channelled into this need and can extend into other areas of functioning. Findings of long term research carried out at the Mifne centre showed;

a. significant improvement in eating habits and a reduction in autistic symptomatic behaviour following treatment.
b. a correlation between children's eating habits and symptomatic autistic behaviour.

Findings also indicated an increase in parents' relationship and confidence levels, and a decrease in their overprotection, stress, and crisis levels that evolved around the topic of eating disorders. There appears to be a relationship between children's eating behaviour and the diagnostic characteristics of autism. Challenges of mealtimes, become part of the daily programme and in most cases constitute a crucial part of the therapy.

> We have to dare; scientific progress is the result of field exploration. Experienced therapists have a lot of power to change traditional perceptions. Do not wait another decade to lower the diagnosis age.

At every mealtime, at least three times a day, the therapist brings in the meal and places it on the table. He/she invites the child to the table. This may continue for three or four days. Gradually, the child begins to eat. Children don't starve themselves, but have to overcome the obstacle of fear, which is the main cause for their refusal. Eating Disorders in Autism are now described in DSM-5.

15 *What are the components of aftercare treatment at home?*

Upon completion of the treatment at the Mifne Centre, the long-term, second stage of treatment begins. The parents are trained to continue RPT at home. This requires daily sessions in a playroom, where the child spends several hours each day with his parents and trained therapists. The therapy sessions taking place at home are gradually reduced, according to the child's progress. The follow-up is supervised by a senior Mifne staff member. This strategy is phased down over an extended period, as the child's integration with his peers gradually increases.

16 *How do you ensure Integration of the toddler in society within his own peer group?*

As the toddler initiates more social contact, they become more capable of communicating in a socially adaptive manner. This is an interactive process that depends upon each toddler's functional ability; it may take months until the toddler is capable of joining a peer group.

The final stage of treatment is the process of integrating the toddler with their peer group, in most cases a suitable mainstream nursery school or kindergarten, to enable the toddler's social interaction.

The toddler's exposure to other toddlers, their language and play, contribute to their developmental process, accelerate it, and help the toddler to advance increasingly closer to optimal functioning ability. This entire process is supervised by a Mifne therapist. Mifne Centre statistics from 1995-2005 (Alonim, et al., 2007) show that 74.8% of the toddlers treated at Mifne, have been fully integrated in mainstream schools.

17 ***What do you consider as your biggest achievement after creating Mifne centre and whom do you credit this success with?***

I would credit the Mifne Swiss Foundation which has been supporting us for the last twenty years, enabling the Mifne Centre to succeed in Israel and overseas. I believe that our biggest achievements were: in the late 80s, when we succeeded in lowering the age of diagnosis in Israel, from the age of five to three. Then, between 2007-2010, when we lowered the age of diagnosis to one and a half -two, which is the earliest diagnosis of autism in the world. These achievements have changed the life of many infants and their families.

18 ***Apart from your home country, where all is Mifne approach followed and how are you ensuring that it spreads across the globe?***

Speaking in international conferences and publishing papers, is probably the best way to spread the method across the globe. We have trainees coming from all over the world, who study the method and work with families in their countries. There is a Center in Basel University, Switzerland, which adopted the Mifne method, and whose therapists were trained in Israel and another centre is planned in LA.

19 ***Have you ever been to India ? Would you like to visit our country and spread the concept you have developed for the benefit of children with autism in particular & society at large?***

I haven't been to India. Though I know from my daughter and many friends, that it's a fascinating country. We have also treated a few Indian families and have been exposed a bit to the Indian culture. It would be a great honour to speak about the Mifne concept in your professional community.

20 ***Can u give us a peep into your personal life and tell us how do you balance work and pleasure. What all do you do at your leisure time when not working?***

Well, I like this question.... Since I've been growing up - professionally and personally - in line with the development of the Mifne method, this project is a major part of my life. I suppose that external people may think my life is unbalanced, but I feel so lucky to enjoy my clinical experience and research exploration, which bring sometimes difficulties, but mainly a lot of satisfaction. My leisure time is dedicated to my husband, children and little grandchildren who are my engine.

21 ***What is your word of advice to the young physiotherapists & other professionals from India, working in the field of Autism?***

Working in the field of autism is a huge challenge:

a. One needs much empathy, curiosity, patience, belief, knowledge, modesty and hope, in order to reach a detached child who is often led by his own anxieties and difficulties to understand the environment, but at the same time over sensitive to sounds, lights, touch, smell and human behaviour.

b. We have to dare; scientific progress is the result of field exploration. Experienced therapists have a lot of power to change traditional perceptions. Do not wait another decade to lower the diagnosis age. Autism may be seen in most cases at the age of one! This is already noted in the DSM-5.

Interview with

Dr.Maya Nanavati

A Veteran Occupational Therapist's Perspective on Autism

Dr. Maya Nanavati is an Occupational Therapist with 40 years of experience in Neurology and Paediatric Rehabilitation. She was the Head of the Department of Occupational Therapy at Sir Hurkisondas Hospital in Mumbai for 34 years. She is the Founder Trustee of POSAT Foundation (Physio-Occupational-Speech Academy of Therapists), and the Co-ordinator of the Rehab unit and special classes for challenged children run by POSAT. Dr. Maya is also a consultant at many paediatric units, and a member of the Faculty at the Nalanda Dance Research Centre and Arya Vidya Mandir School, in Mumbai. She has presented research papers in International Conferences in Germany and Australia. Her workshops and courses on Learning Disability are very popular.

1 Kindly introduce yourself to our readers in brief and the phenomenal work you have been doing in the field of Autism for all these years.

Ms. Maya P. Nanavati, I am an Occupational Therapist graduated from Bombay University in the year 1970. I started my carrier as an Occupational Therapist at C.P Unit of Children's Orthopaedic Hospital in Mumbai. Was head of the Department of Occupational Therapy at Sir Hurkisondas Hospital in Mumbai for '34' years. I find the field of paediatric and neurology very challenging and from college days I wished to work with the patients with neurological impairment and physically and mentally challenged children. I was co-ordinator of Rehab Unit of S.E.C day school for many years. Currently I am a co-ordinator of Rehab Unit and special classes for challenged children POSAT Foundation at Borivali – Mumbai and at Shartul Foundation Ghatkopar –Mumbai.

2 How has it been working with these special children of God & what has kept you motivated in giving your best to these children ?

In last fifteen years the number of Cerebral Palsy Children at least in big cities like Mumbai has decreased due to NICU facilities and awareness about risk factors of foetal distress. The causes like cord around the neck or meconium aspiration or neonatal hypoglycaemia now results into ADHD, Learning Disability or Dyslexia .The number of autistic children also has increased in last five years. Anyone working in the field of paediatric automatically will get more referral of these children .For myself I would say that I love to treat autistic children because I feel, God has defaulted their sensory design and as a therapist I have to try redesigning their sensory maze .This appears very challenging to me. I always pray God to help me out in my effort. Every child is unique with his/her defaulted sensory systems and defective brain pathology though there may not be obvious neurological damage. Therapist needs to be logical, creative and intuitive while planning the management of their therapy. This keeps me motivated and charged to work with these children.

3 What are some of the most common myths that you have seen prevailing amongst parents and the society when it comes to their understanding about Autism?

Once,the child is labelled autistic the parents get a shock of their life. They start surfing the net and get more confused. Less educated people think, it is some kind of a curse on them. If the child is severe, it is believed that he is possessed with some kind of evil power. Some parents feel, God has chosen them to look after this special child. Very rarely the parents get support of the society because of the child's unpredictable hyperactive behaviour. Theoretically lay people are aware about autism but practically, the reactions of the people towards these children at public places are different .So most of the parents prefer to avoid public places e.g garden or shopping mall or restaurants.

4 What role one can play as professionals to dispel these myths?

The professionals who are dealing with autistic children have to be very patient. They themselves need to be positive for the results of therapy and other medical treatment. The positive attitude will help in counselling the parents and family members. It is the duty of the professionals to prepare the family to face any problem in the society with courage.
For changing the attitude of the society film like Barfi helps. The awareness about autism through media can educate the society at large.

5 In the past years, have you seen any change in the perspective and attitude of parents & Society towards Autism? What reason do you attribute to this change?

I feel, the parents who are surfing net and google have negative attitude towards their child's improvement. They loose the time of therapy in worrying about the future of the child. The projection of anxiety of the parents on child hampers the child's progress. For society at large one cannot generalise any statement as it depends upon an individual about the reaction towards particular problem. But, atleast after the movie 'Barfi' it is easier to convey about autism like after the movie 'Tare Zamin Par' people started understanding learning disabled children.

6 An important component of management of autism is the role played by parents as active collaborators in the process. Your comments.

I feel,parents especially the mother is the best therapist as she is the person who is most bonded with the child .She loves the child unconditionally. That helps the child the most. If a mother is working I sometimes advise her to take sabbatical leave to be with the child and follow the home program at intervals throughout the day. Tight hugging by mother gives lot of security to the child and child gets integrated. His emotional outbursts and hyperactivity reduce drastically.

7 Given the emotional turmoil the parents and the caregivers go through in bringing up a child with Autism, how as a professional, one can help them in dealing with the day to day issues and what best strategies can be adopted in caring for the caregivers?

The autistic child behaves differently because of his sensory issues. Unless they are dealt with precisely his/her behaviour does not get modified. Therapist has to show the parents and the care givers home program for sensory modulation. All autistic children have poor orientation of their body in space because of Vestibular System dysfunction, over and above that, they have defective kinaesthetic feedback, tactile defensiveness and olfactory system working at high voltage .As I said earlier defective sensory design results into their uncontrollable behaviour. Simple home program of rotation on swing, pressure on the body with rubber plastic ball helps the parents and the care givers lot of relief. At our centre we advise the parents to apply light perfume on the child's clothes before sending the child to school or taking him out in a mall. This makes the child comfortable even in crowd .Every child needs tailor made sensory modulation program, if, followed at home properly shows amazing results. Simultaneously a child is benefited with behavioural training by counselling psychologist, for or communication skills the treatment and guidance from Speech Therapist and for education from special educators.

8 How has neuro-rehabilitation for Autism evolved over the years?

With technological advancement the diagnostic tools change the world of Neuroscience, early diagnosis of autism is possible .The PET Scan shows the defective areas in the brain which can be co-related with the clinical symptoms. Professionals working with these children are able to modify their treatment program with their knowledge. The research on Neuroplasticity has widened the horizon in the field of Rehabilitation of any condition. The therapist can utilize other normal areas of brain to get the required function with right stimulus e.g sensory integration program in autistic children.

9 Over and above the main stream therapies, what role you think alternate therapies like Drama, Music, Art, Yoga etc play in helping these children improve their quality of life?

Definitely the children with autism are right hemispheric individuals .Most of them have defective corpus callosum resulting into poor communication between musical or artistic right hemisphere and verbal left hemisphere. Both the hemispheres in them work independently .That is the main reason of echolalic speech. With drama, dance and singing we can train their right hemisphere to pick up communication to an extent. It helps in improving non-verbal expression which is the function of right hemisphere. Yoga and physical exercise helps improving

their body awareness. This reduces the hyperactivity improves their focusing in learning given task and modifies their behaviour.

10 Traditionally in India, physiotherapist haven't been a part of neuro-rehabilitation for autism, do you for see a role of physiotherapist in treating children with Autism?

Personally, I do not believe in the compartments of Occupational Therapist treating upper limbs, Physiotherapists treating lower limbs and Speech Therapist looking after only orofacial area & speech and language development. Any professional in the field of Rehabilitation must understand a patient as a human being whether it is Physiotherapist, Occupational Therapist, Speech therapist or any other professional who is working with autistic children have to thoroughly know the causative factors of clinical symptoms e.g sensory chaos, low muscle tone because of vestibule-cerebellar dysfunction, behavioural disturbances due to chemical imbalance of neurotransmitters in amygdala and defective frontal lobe. Occupational Therapists are trained in Sensory Integration Therapy .So it is easier for them to work with these children.

11 What is your take on inclusive schooling for children with Autism?

This question about inclusive education is very dicey. Now adays all the children with special needs with average intelligence are admitted in mainstream schools. Concept of shadow teachers is getting popular atleast in Mumbai. Autistic child has inconsistent behaviour .It becomes difficult in class of '40' to '60' to control this child's sudden emotional outbursts or his desire to move around. If the school has resource room facility with professional counsellor and special educator, when the child becomes uncontrollable in a class and disturbs the whole class he needs to be immediately taken there. If resource room facility is not available in the school, it is extremely difficult to handle an autistic child because of his sudden mood swings. Professionals and Parents have to be realistic for seeking admission in regular school. Inclusive education should not harm the child and also to the other children in his class.

12 How is India different from the western world in managing autism? Are we at par or do we lag behind in some aspects?

I had just been to U.S and have been to few paediatric centres in different cities, also visited few schools with facility of inclusive education for autistic children. I am proud to say that we are at par with them for therapeutic management of these children in spite of limited resources, constraint of space and many other restrictions. Only our country lags behind in the system of school based therapy. Most of the schools over there have therapist visiting the schools once or twice in a week depending upon the number of children with special needs in the school. Up to the age of three any child is treated free. Many schools in Mumbai want to hire Speech Therapist and Occupational Therapist in their school but I feel we have shortage of therapist here due to braindrain and the therapist here are not yet tuned to explore the scope in the school based practice.

13 In an Indian scenario do you think adults with Autism live independent lives? What are the barriers you find in this regard currently?

Not only in India, even in Western countries it is very difficult for autistic adults to live independent life because of lack of social skills. They may be educated but have limited scope in open employment unless a person is extremely high functioning. In metro cities the life is very stressful for them, may be in small town they may manage themselves to an extent but they may always need support from their relatives throughout their life.

> We have to be supportive to the parents with positive attitude, emphasise the role of simple home program and give them confidence that together we will try to solve the maze of the chaos in their child's life and God will help us.

14 What is the help available to these children and their families from the government and other not profit organisations?

I actually do not know much about the government facilities .I know that there is modified National Disability Act in which there are lot of provision of autistic persons. There are many NGO's and also support groups like forum for autism started by parents. The parents can google search on net to know about facilities available in their own city.

15 What advice would you like to give to professionals from different specialties working in the field of autism?

The professionals working with autistic children have to be really interested in taking up challenges. They have to take time to observe the child during clinical evaluation, analyse the behaviour of a child and co-relate that with causative brain dysfunction or sensory modulation impairment instead of mechanically filling DSM –IV Form and judging the severity of autism. We have to be supportive to the parents with positive attitude, emphasise the role of simple home program and give them confidence that together we will try to solve the maze of the chaos in their child's life and God will help us. Real Rehab professionals are not technicians; we have to be scientific healers.

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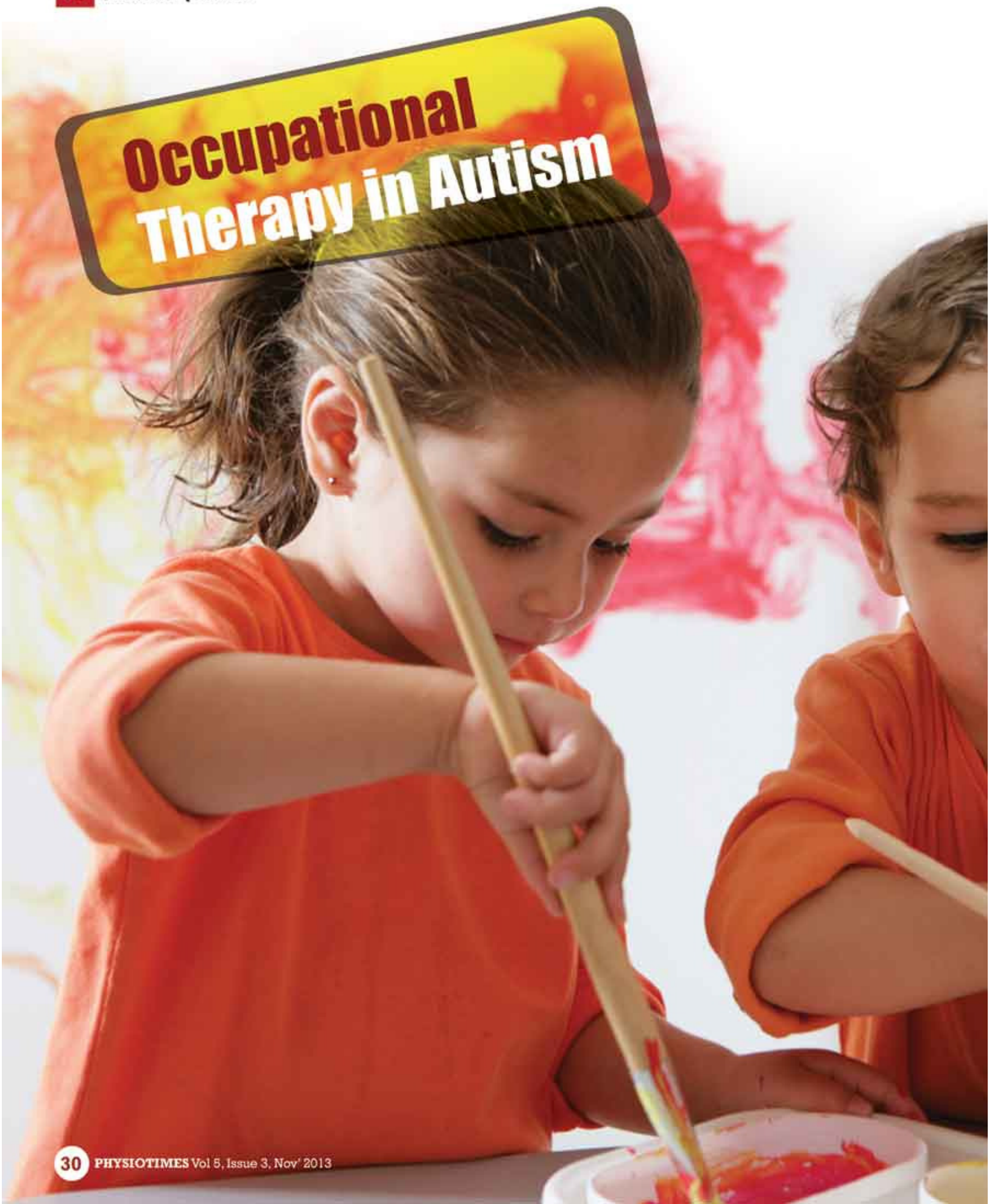
Occupational Therapy in Autism



Rohan* (name changed) who is 14 years old goes to the bus stop to drop his sister and picks her up when she returns from school. He plays with his sister and shares his chocolates with her and hugs his parents with love.

Sonia*, (name changed) a 11 year old girl is almost capable of taking care of her personal daily activities and is able to focus on her activities at hand for upto 10 minutes. Her parents are now able to go out for upto two hours leaving Sonia and her sibling at home.

Nothing amazing if you consider an average child but both Sonia and Rohan are not what you would term average. They were both diagnosed with autism.

Autism is a complex neuro-developmental disorder that results in difficulties in social interaction, understanding, thought processing, reasoning abilities, verbal and non-verbal communication challenges and behavioural issues. These difficulties affect the individual's ability to perform personal hygiene, work, play, and social activities at home, school, and in the community. They also impact the individual's role fulfillment within these settings. Because of this disruption,

Occupational Therapy focuses on those activities that occupy us every day and the roles which fill our lives. This is a broad range that spans from our personal hygiene activities, to our work activities in our homes and at our jobs, to our play and social activities. When we are able to complete these activities, depending on the setting, we fulfill roles in our lives-perhaps as member of a family, as a friend, as a student.

Occupational therapy practitioners provide services to individuals with an ASD through a variety of service delivery models including direct service, consultation, group intervention, and community-based services. In addition, occupational therapy practitioners participate in education and advocacy activities at persons, organizations, and population levels.[1] occupational therapy has a place in
1) identifying how the ASD impacts function in daily occupations &
2) providing support to maximize daily performance activity. (2)

Occupational therapists also work as an integral part and coordinating member of a team that includes parents, teachers, and other professionals like psychologists, speech therapists, special educators etc. They help set specific goals for the person with autism (that often involve social interaction, behaviour, and class room performance) that ultimately try to improve their quality of life. [3]

A: Rohan* (name changed) had a history of hyperactivity, poor social interaction absence of emotional behavior, socially unacceptable, aggressive and self injurious behavior. By the age of 14, his parents were finding it very difficult to tackle his aggressive behavior and their worries regarding his future kept increasing with each passing day.

B: Sonia* (name changed) is a 11 year old girl who was diagnosed with a severe case of autism exhibiting several symptoms such as hyperactivity, inattention to any task, repetitive actions, aggressive and inappropriate social behavior, head banging, biting herself etc. She also needed help in completing her daily living tasks. Her parents and siblings were worried regarding the future course of action especially as she grew older and would enter puberty.

Children with autism demonstrate global developmental difficulties and challenging behaviors. However, since it affects every child differently; each and every child needs to be evaluated and a goal plan developed individually keeping their specific requirements and goals in mind. The performance of the child at school, home and in the community needs to be considered first when assessing children with autism.

Multidisciplinary and transdisciplinary intervention constitutes two of the models commonly used for these children. Occupational therapy, psychological counseling, speech therapy, behavior therapy is essential for children with autism (case smith 6th ed.). Occupational therapists perform evaluations to diagnose, plan interventions, or determine the effectiveness of treatment [4]. A functional assessment is composed primarily of observations across contexts and interviews with significant others in the child's life such as parents and teachers. Behaviors need to be considered within the typical routine of the child's day, including specific activities, diet, and types of medications.

Challenges often emerge when an occupational therapist assesses how the characteristics of ASD impact the daily activities of an individual. The individual or his/her family often describes unique occupation interests which may be a repetitive, physical activity like rocking back and forth, or chewing on a shirt sleeve, or watching a fast paced light flicker. The unique interest has the effect of interrupting a functional daily task.

Occupational therapist conducts a comprehensive assessment which provides a detailed understanding of child's history and overall development. The assessment lays the groundwork for individual goal setting and occupational therapy treatment. Further assessment may show that the unique interest may be a way the individual avoids challenging functional occupations or situations that overwhelm his/her senses. [4]

The information about child's abilities, deficits, needs and barriers are identified through interviews, observation & performance of a standardized test batteries or proformas such as:

Some of the Assessment tools used by Occupational Therapists

- Indian Scale for Assessment of Autism
- The Autism Spectrum Rating Scale (ASRS)
- The PDD Assessment
- Scale/Screening Questionnaire
- The Peabody Development Motor Scales
- (CARS)
- Toddler Infant Motor Evaluation (TIME)
- Bruininks-Oseretsky Test of Motor Proficiency (BOTMP)
- Developmental Test of Visual Motor Integration (VMI)
- Sensory Profile
- Sensory Integration and Praxis Test (SIPT)
- Minnesota Handwriting Assessment
- Test of Visual-Perceptual Skills (TVPS)

A: On assessment it was identified that Rohan had difficulty with design copying, positions in space, sequencing, tracing and stenciling. Fine motor tasks such as buttoning and tying shoe laces were also a problem. He needed moderate assistance for all his "Activities of Daily Living (ADL). This was measured on Functional Independent Measure on which he scored 87 out of 126.

B: On assessment on the Indian scale for assessment of Autism (ISAA) Sonia scored 125 which indicated a moderate degree of disability. Functionally she required assistance for all her ADLs as measured by the Functional Independence Measure on which she scored 69 out of 126.

Based on the assessments, an unique intervention program is developed and implemented with the child. Current research indicates that there are certain elements shared by effective interventions which are:

Cognitive Skills

Use of a pencil with gripper

Sensory Integration Room

Visual & Perceptual Skills

- Intervention begins early.
- Staff are highly trained and specialized in Autism.
- Intervention is carefully planned and research-based including plans for generalization and maintenance of skills.[2]

The intervention program aims at:

- Providing interventions to help an individual respond to information coming through the senses. Intervention may include developmental activities, and activities that promote sensory integration.
- Facilitating play activities that instruct as well as aid a child in interacting and communicating with others.
- Devising strategies to help the individual transition from one setting to another, from one person to another, and from one life phase to another. Events such as birth of a sibling, moving to a new home, transition into or out of school and seeking, obtaining and maintaining employment.
- Teaching Adaptive techniques and strategies to get around apparent disabilities. for eg. teaching the child to use a keyboard when writing is simply impossible, or use of a pencil with gripper when a child has difficulty in writing.[5]
- Providing support for the Caregiver includes strategies for stress and anxiety management, caring for the individual with an ASD and balancing life responsibilities. Parents and caregivers are faced with many stressors since an ASD diagnosis affects not only the person diagnosed, but also the entire family. These may include
  - difficulty in obtaining an appropriate diagnosis for their child,
  - making decisions about intervention and educational planning,
  - coping with financial strain,
  - grief
  - managing daily behavioural challenges, some of which may be due to unusual responses to sensory stimuli.
  - Marital relationships can become strained and siblings may feel neglected or resentful of the attention given to the child with an ASD.

Communication with other professionals working with the client to ensure services focused on meaningful and relevant occupation and contexts.

Some of the skills occupational therapy may foster are,

- ☆ **Behavioural Skills**
- ☆ **Sensory/Motor Integration**

Sensory processing is the normal neurological function that all people experience when their brain processes sensory information from the environment around them. Most of us unconsciously learn to combine our senses (sight, sound, smell, touch, taste, balance, body in space) in order to make sense of our environment. Children with autism face difficulty while doing this. Sensory integration therapy is a type of occupational therapy (OT) that places a child in a room specifically designed to stimulate and challenge all of the senses. During the session, the therapist works closely with the child to encourage movement within the room to encourage appropriate, productive and adaptive movement responses. [6]

- ☆ **Gross and Fine Motor Skills**
- ☆ **Visual and Perceptual Skills**
- ☆ **Cognitive Skills**
- ☆ **Communication & Social Skills**
- ☆ **Daily Living Skills** such as toilet training, dressing, brushing teeth and other grooming skills.

For Rohan various activities were initiated and then over a period of time, the level of complexity of the activity was increased. New goals were identified as he was able to handle the increasingly complex tasks. Further positive reinforcement was provided at appropriate intervals. Most importantly, the parents were an integral part of the program and were also educated on activities that could be followed at home such as money management using token economy.

Some of the sensory rich activities that were carried out were wheel barrow walk, commando crawling with full body, wall push-ups, complete an obstacle course with a variety of obstacles.etc. He was taught to identify, match and label sounds, blow whistles, identify appropriate music. He learned to play mirror image and imitation games, and puzzles and mazes legos block designs were used to understand relation between objects, direction, manipulation etc.

For Sonia, basic level activities were carried out which included Identification of fruits, animals, vehicles, shapes, and colours. Tying and opening knots, identification of body parts with right left discrimination, Concept of up and down, Walking on line, Reach outs on balance board, Ball throwing and catching. Activities to improve command following were also given.

The aim of an occupational therapist when working with a child suffering from ASD is to eventually integrate the child with the outside world at large.

Depending on the severity of the affliction and the extent of therapy provided, a child with Autism may be able to:

- Climb stairs, ride a bike, hold objects and cut with scissors
- Tell the difference between colours, shapes and sizes.
- Read and write.
- Improve awareness of his body and its relation to others.
- Develop peer relation and adult relationships
- Learn how to focus on tasks.
- Learn how to delay gratification.
- Express feelings in more appropriate ways and use augmentative forms of communication. For example Manual Sign, Picture Exchange, Computerized Communication Systems etc.
- Engage in play with peers.
- Learn how to self-regulate.

A: After stem cell therapy and the rigorous occupational therapy, within six months, Rohan's hyperactivity reduced by almost 80% and his attention span improved. He displayed emotional bonding with his father, mother and sister .i.e. he would play games with his sister, share a chocolate with her or even hug his parents with joy. Now he interacts with children of his age and actively plays with them. He walks his little sister to the bus stop everyday and even goes to pick her up after school. His academic performance improved and he cleared his Vth Standard (Second Level) at the National Open School Exam and is now preparing for his Third Level. His score on the ISAA reduced from 81 to 51 and has become increasingly independent. His FIM score has increased from 87 to 111 as he is almost independent for all his ADLs. He also helps his mother in cutting vegetables, folding clothes, etc.

B: Sonia was on intensive occupational therapy and speech therapy intervention post stem cell therapy. Parents noticed that her eye contact improved, and she was more alert and her attention to activities at hand improved. Her hyperactivity had reduced and she could now sit for atleast 10 minutes at a stretch. She could interact with her younger sister and also attempted to interact when people came to visit. Self injurious behavior like biting and head banging completely disappeared to the relief of her parents. Her ISAA score improved from 125 to 110. The degree of assistance provided by the mother for activities like bathing, dressing, brushing, etc had reduced significantly. Her parents got some peace of mind and could leave the children at home to go outdoors for atleast two hours.

The nees of an individual with ASD can change with time especially with age or with various life altering events. Hence it is imperative that the assessment and reorientation of goals be an ongoing process to help the child successfully integrate and become a contributing member of the society.

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Building bridges across the two world

A Psychologist's take on Autism

I don't speak much but I have lots to say. I can't express well but I have feelings. I may look through you but I see you. I may not follow your command but I do understand you. I don't see the world in the way you see it but I have a wonderful world of my own.

Akshata Shetty,
Clinical Psychologist (M.A.)
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Autism is a complex neurological disorder which affects the normal functioning of the brain and the development of the child's ability to communicate verbally and non-verbally, understand language and relate to others. It is one of the most puzzling childhood psychiatric disorder, which has been extensively researched for as there is no definitive proven cause or cure. Also, the prevalence is increasing an alarming rate.

What is the role of a Psychologist in Autism?

Psychologists are well equipped to assist children who have autism and provide support to their families. They work with other professionals like paediatricians, psychiatrist and other therapist to diagnose and treat children with autism. A psychologist provides a wide range of psychotherapeutic interventions, like floor time with the child to family therapy sessions with the parent or sibling who have difficulty coping with an autistic child, to behaviour modification training to the parents or caregivers. This speaks volumes about the key role that a psychologist, plays in changing the lives of children with autism and helping their families with strategies of how to deal with their child or sibling. *(Ref. Fig. 1: Floortime with the child with the help of play therapy)*

When should a child see a psychologist?

A child with autism should visit a psychologist for confirming the diagnosis, to know where the child stands on the autism spectrum i.e. the severity of the disorder, to know the intelligence and social quotient of the child. Also, it's best to consult a psychologist when a child displays behavioral issues, mood problems or learning difficulties. Earlier the diagnosis and beginning of the intervention process the better is the child's prognosis.

A psychologist would not only work with the child but also help the family understand and deal with the situation through counseling sessions. *(Ref. Fig.2: Self-injurious behaviour & Fig. 3: Aggressive behaviour towards others)*

What is the role of a psychologist in diagnosing the child?

Diagnosing children with autism becomes very difficult as they do not display any obvious physical problems and their test reports like MRI, BERA and other blood investigations are reported to be normal. Hence a psychologist would first take a detailed history of the child i.e. the milestones development, cognitive development, social interaction with family members and others, family history and other details which would help understanding the child at home, school and social set up. After which a psychologist would conduct a number of tests to gauge the severity of the disorder.

What does assessment of a child with autism involve by a psychologist?

Informal Assessment by A Psychologist

A psychologist's usually interviews important people in the child's life which includes parents, other carers, teachers and therapist. The psychologist would observe the child behaviour in different settings and would administer formal tests. Psychologist usually look out for areas like: how the child responds emotionally to physical contact, use of eye contact and facial expression, evidence of stereotypical mannerisms, repetitive use of language and the child's capacity for self-expression.

Formal Assessment tools used by Psychologists

Formal assessment may involve the administration of instruments that have particular relevance to the diagnosis of autism like:

- ***Childhood Autism Rating Scale (CARS)*** – This differentiates children with autism from other developmental disorder.
- ***Social Communication Questionnaire (SCQ)*** – To evaluate the communication and social functioning of the child.
- ***Modified Checklist for Autism (M-CHAT)*** – To evaluate the social communication & behaviour.
- ***Autism diagnostic observation schedule (ADOS)*** – To evaluate the social and communication behaviour related to the diagnosis of autism.

Malin's Intelligence Scale for Indian Children (MISIC) - To evaluate the intellectual functioning or quotient (IQ) of the child. *(Ref. Fig. 4: IQ testing for a child & Fig.5: IQ testing for an adult)*

All the above tests have age criteria's and a clinical psychologist would be conducting and providing you with the report. The information gathered from assessments is used by psychologists to make recommendations for individually - designed intervention programs that meet the specific needs of each child. As a physiotherapist the test interpretation would be helpful for you, as it would give you a picture about the child with autism and the level and degree of therapy required for the child.

Psychological Therapies for Autism

The information collected during the assessment helps the psychologist to develop a treatment plan that is tailored to the child's needs. Psychologists use a range of techniques including behavioural strategies to reduce undesirable behaviours and promote desirable behaviours; social and life skills training for maximizing their level of independence and emotional and mood regulations to help children with autism cope better with their situation.

Behaviour Therapy

This involves in altering the behaviour of a person with autism to reduce dysfunction and to improve quality of life. This can be achieved through teaching techniques to the child which is designed in a way that it reinforces the desired behaviour and eliminates the undesired behaviors. Intensive Behavioral Therapy should start before 3 years of age for a better prognosis. There are many behaviour modification techniques which can be used reduce or eliminate the undesirable behaviour like

- ***Token economy***

Token economies are used as a method of strengthening behaviour, or increasing its frequency, because the tokens are a way of "paying" children for completing tasks and the children can then use these tokens to buy desired activities or items. Tokens could include points to stars to stickers depending on the child's age and level of understanding.

- ***Extinction***

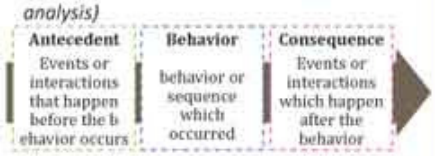
This strategy is used to reduce the inappropriate behaviour or stopping it altogether. Behaviours occur for a reason i.e. they get us things we want. If we stop getting what we want after we engage in certain behaviour then that behaviour will eventually stop occurring or becomes extinct because it no longer serves any purpose for us.

- ***Positive Reinforcement***

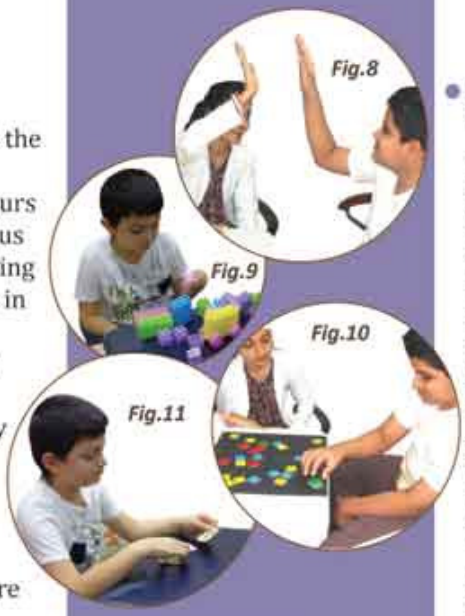
When a desired behaviour is followed by reinforcement there will be an increased future frequency of that desired behaviour. This basically means that if you engage in certain behaviour, and this behaviour gets you something that you wanted, then you are more likely to engage in that same behaviour again when you want the same outcome in the future. *(Ref. Fig. 6: Positive Reinforcement)*

Applied Behaviour Analysis (ABA)

ABA has been used widely by psychologist to teach communication, play, social, academic, self-care, community living skills and to reduce problem behaviours in learners with autism. ABA method uses the following three steps to teach *(Ref. Fig.7: Applied Behaviour analysis)*



There are many types of Applied Behaviour Analysis (ABA) like ***Early Intensive Behavioural Intervention (EIBI)*** as the name suggests this is a pre-school home based programme designed for children with autism aged 2 to 6 years.



This method involves in breaking the behaviours down into sub-categories and teaching each sub-category through repetitions, positive reinforcements and prompts which are gradually reduced to removed from the child's programme.

Discrete Trial Teaching (DTT) involves teaching individual skills one at a time and making use of repeated teaching trials in a hierarchical manner by using techniques like changing, shaping and fading and a systematic reinforcement system that needs to be put in place. It also requires continuous monitoring of the progress and generalizing the appropriate learnt behaviour to a progressively less structured and more natural environment. For example, a behaviour therapist and a child are seated at a table and the therapist prompts the child to pay attention to her by saying "look at me." The child looks up at the therapist and the therapist rewards the child with a high-five. *(Ref. Fig.8: Discrete Trial Teaching example)*

- ***Pivotal Response Treatment (PRT)*** is used to teach language, decrease disruptive or self-stimulatory behaviour and to increase social, communication and academic skills by focusing on critical or pivotal behaviours that affect a wide range of behaviours. The goal of PRT is to produce positive changes in the pivotal behaviours, leading to improvement in communication skills, play skills and social behaviours. Four pivotal areas have been identified: (a) motivation, (b) child self-initiations, (c) self management, and (d) responsiveness to multiple cues. It is believed that when these areas are promoted, they produce improvements in many of the non-targeted behaviors.

- ***Verbal Behaviour (VB)*** is a form of behaviour therapy which is designed to motivate a child to learn language by developing a connection between a word and its value. Analysis of the underlying function of much so - called 'challenging' behaviour of children with autism-spectrum disorders indicates that these are frequently a reflection of their very limited communication skills.

Failure to understand what is going on around them and the inability to express their needs and feelings verbally leave many children with no effective means of communicating other than by actions, which may be of an aggressive or disruptive nature. Example of verbal behaviour therapy:

Behaviour therapist - What is this?
Child with Autism - A glass
Behaviour therapist: What do you use a glass for?
Child with Autism -Drinking
Behaviour therapist: What do you drink out of?
Child with Autism - A glass

- ***Individual Work Systems*** - Work tasks for specific skills are physically displayed in the basket with the "work" to be completed placed to the student's left, which he is expected to complete independently. Examples of tasks: matching, sorting, sequencing activities, assembly of activities and functional academics (pre-math and pre-reading). *(Ref. Fig.9: TEACCH Sorting blocks & Fig.10: TEACCH sequencing activities)*

Training and Education of Autistic and Related Communication Handicapped Children (TEACCH)

The **TEACCH** approach includes a focus on the person with autism and the development of a program around the person's skills, interest, and needs. Young children may sit at a work station and be required to complete certain activities, such as matching pictures or letters.

This is a very structured way of teaching which includes the following components:

- **Highly Structured Learning environment** - This includes a separate area which is designed for specific activities like a work stations, play areas and group work areas. The work areas are designed in a way that visual organization, visual clarity and visual instructions are stressed at and distractions are kept to the minimum.
- ***Programme*** - The sessions are well programmed and focus on functional communication, vocational and independence training, community – based instructions and leisure and social training.

ABA therapy Sessions

ABA sessions are usually 2 to 3 hours long with short periods of structured time devoted to a task. The duration and type of sessions change according, to the needs and functioning of the learner. Applied behavioral analysis (ABA) is a form of behavioral therapy that is popular. This therapy has a 47% success rate.

Cognitive behavioral interventions and social skills training

target the co-morbid anxiety, response to social interactions with other children and adults, initiating social behavior, minimizing stereotyped behavior while using a flexible and varied repertoire of responses, and self-managing new and established skills.

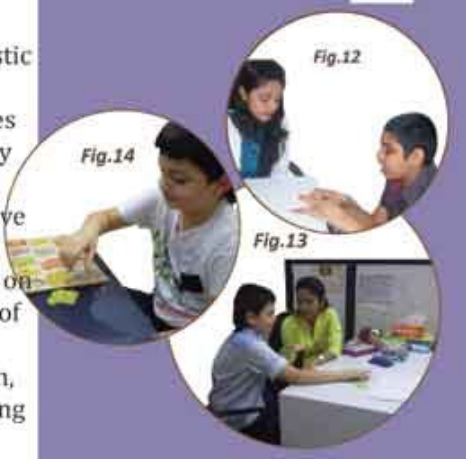
Cognitive Training

It is important to understand that the intelligence of a child with autism ranges from normal to above normal intellectual ability to having learning difficulties. Also many autistic features like increased hyperactivity, sensory issues and motor mannerisms may hinder or reduce their process of learning. Cognitive training for children with autism involves in working on reducing the reaction time of the child, maximizing the attention and concentration, improving the understanding and awareness about their environment. Pictorial demonstration of cognitive training strategies *(Ref. Fig.11: Cognitive Training - Memory Games & Fig.12: Cognitive Training - Joining puzzles & Fig.13: Cognitive Training - Recognition of alphabets & Fig.14: Cognitive Training - Recognition of numbers)*

Caring for Caregiver

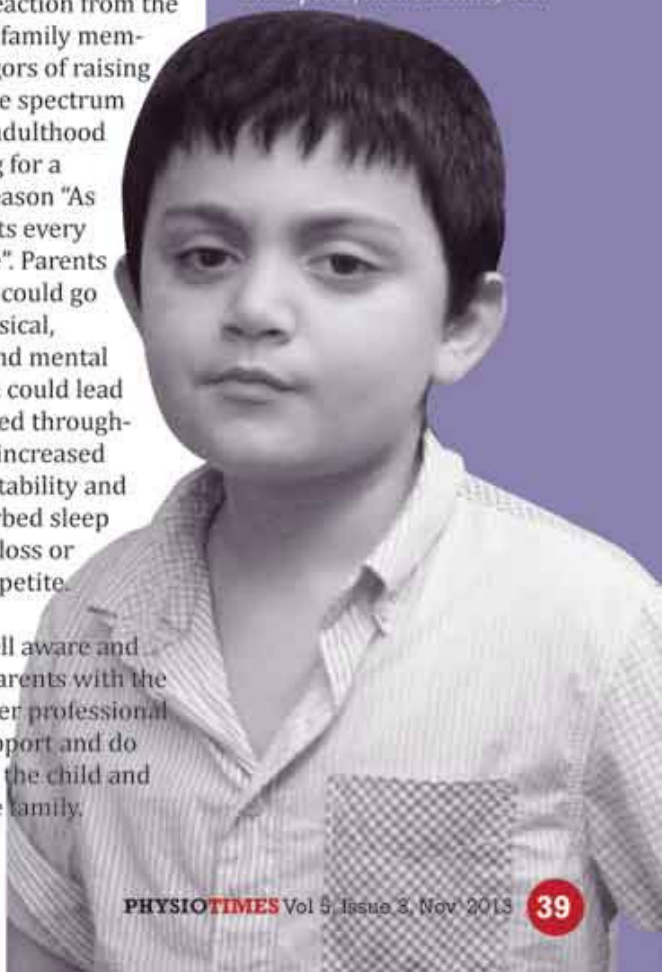
Autism is a condition which affects every family member of the person on the autism spectrum disorder. Often a diagnosis of Autism is associated with a strong emotional reaction from the parents and family members. The rigors of raising a child on the spectrum to fulfilling adulthood are daunting for a very good reason "As autism affects every aspect of life". Parents and siblings could go through physical, emotional and mental stress which could lead to feeling tired throughout the day, increased bouts or irritability and anger, disturbed sleep pattern and loss or excessive appetite.

However well aware and motivated parents with the help of proper professional help and support and do wonders for the child and others in the family.

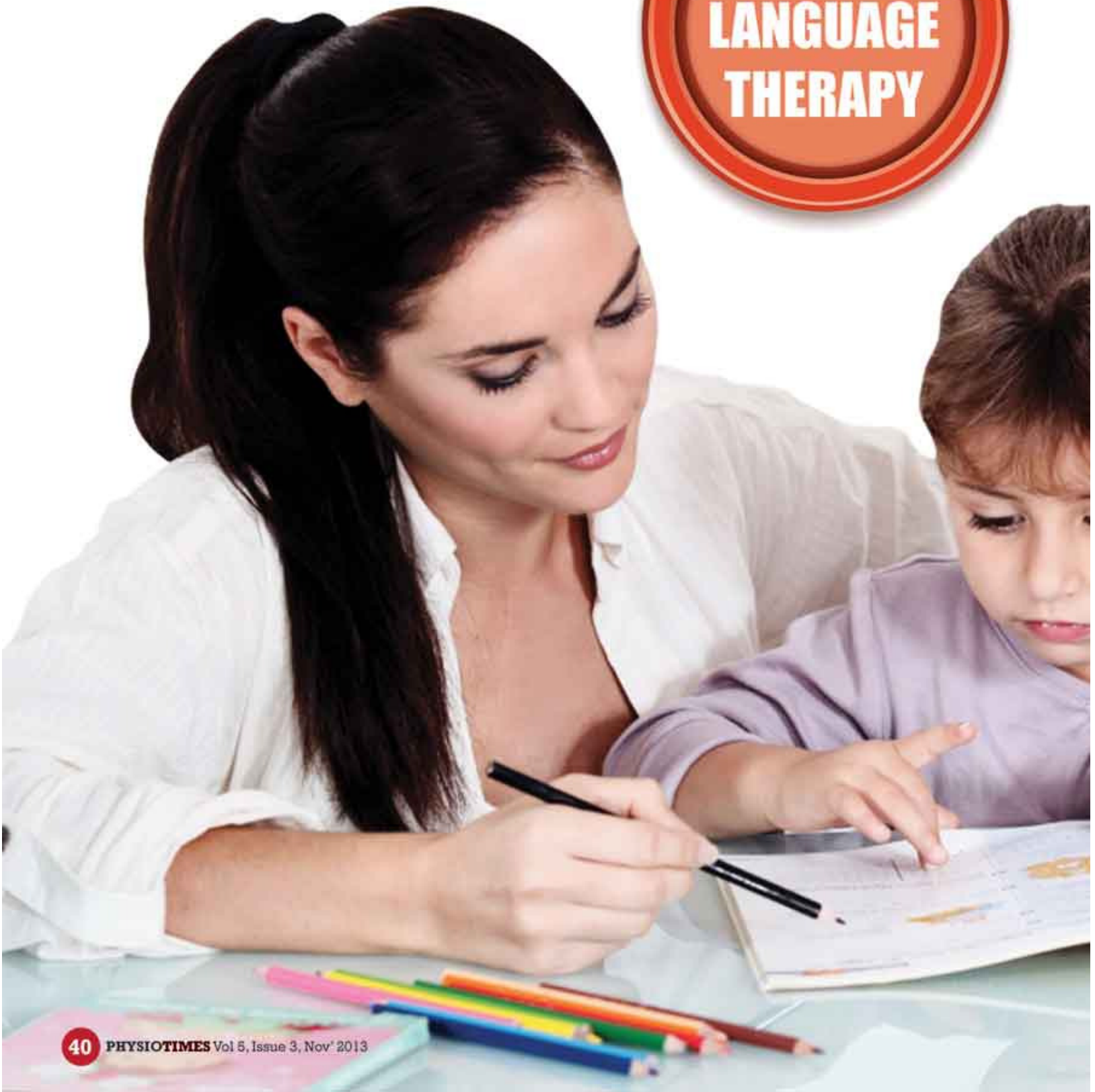


To conclude.....

Children with Autism have a world of their own and they prefer being in their world. Their families, however, would like for them to be integrated into our outside world. Crossing the bridge cannot be done in individual efforts. It requires a comprehensive and multidisciplinary approach, which includes a team of physiotherapist, psychologist, occupational therapists, nutritionist, etc.



SPEECH LANGUAGE THERAPY



THE ROLE OF AN SLP IN THE MANAGEMENT OF CHILDREN WITH AUTISM SPECTRUM DISORDERS

Affecting approximately one in 500 children, Autism is currently seen as a common childhood disorder with core deficits in communication, socialization, play, and behavior. (Prelock,(2001). These core deficits make the Audiologist and Speech Language Pathologist (ASLP) a very important member of the team for effective (re) habilitation of the child and his family. The role of an ASLP includes hearing screening and speech and language evaluation followed by family education and intervention for the speech, language and hearing deficits. The goal is to enable functional communication. Also, monitoring siblings for social, communication, and play skills is important because of the potential genetic link. (Filipek et al., 2000).

Tools such as the Checklist for Autism in Toddlers (CHAT, Baird et al.2000), Modified Checklist for Autism in Toddlers, (M-CHAT, Robins, Fein, Barton & Green, 2001), are used when there are indicators for ASD seen in children at home, playschool or at school. The Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Renner, 1988) is used very commonly in clinical contexts to diagnose children with ASD. (Cited in proceedings of Ad Hoc Committee for A.S.D.)

CARING FOR CAREGIVERS

Caring for a child with ASD is an onerous responsibility and, the demands are intensified when some children have associated co-morbidities; metabolic disorders, sleep disorders and others, compounding the existing problem. Some caregivers are prone to depression and anxiety. The role of the SLP as of all team members is extremely important for extending support to parents at every stage of the child's development and to train them as co-managers in the rehabilitation process.

TEAM

The paediatrician, child psychiatrist and clinical psychologist, OTist, ASLP, special educator, PTist, MSW, classroom teacher and school counsellor along with the caregivers form the team for the (re)habilitation of children with ASD.

MANAGEMENT

SLPs and audiologists must understand the available approaches, evaluate claims of effectiveness, and recognize principles of best practice (Prelock, 2001). Heflin and Simpson (1998) identify three basic approaches: relationship-based--interventions attempting to facilitate a child's attachment, affect, or relatedness (e.g., floor time); skill-based-interventions supporting the development of specific skills (e.g., PECS, social stories, discrete trial learning); and physiologically oriented-interventions attempting to change how information is received and processed by the brain (e.g., sensory and auditory integration, psychopharmacologic and dietary treatments).

The intervention strategies are planned based on whether the child is non-verbal or verbal. In case of non-verbal children with ASD, the SLP needs to work on enhancing sitting compliance, eye contact, joint attention, language comprehension and expression utilising the best receptive and expressive modalities for the same.

Mostly, in clinical application, owing to the heterogeneity in the clinical manifestation of ASD, the SLP trained in various approaches and their guiding principles needs to apply them in an eclectic manner to suit each child's requirements best as is given on the next page.

SETTING

One-on one teaching: Many SLPs believe that this is the best setting for intensive therapy, especially at the start and the child can be exposed to group teaching later.

Autism Dynamic Interventions (ADI), a school for the intervention of children with ASD was inaugurated in BYL Nair Ch. Hospital in October 2008 for training children aged 3-10 years and from 11 years to 16 years in separate batches, on a one-on-one basis, focussing on SI therapy, communication intervention, special education, behavior modification, prevocational / vocational skills training and social development training as suited to the age and needs of the children. Despite regular monthly changes in SLPs posted in ADI, the children show improved eye contact, and enhanced communication within the constraints of their impairments.

Small- group Structured Teaching: Other SLPs believe that it is desirable to use a small group preselected on various stringent criteria for intensive therapy so that many goals are achieved therein and the generalisation of the trained behaviors is an inherent part of the training.

Indian context- Communication- DEALL

Communication DEALL (Developmental Eclectic Approach to Language Learning) is an early intervention program for children with developmental language disorders such as, PDD, ASD, developed by Dr. Pratibha Karanth. It is managed by a multidisciplinary team, with 12 children per unit and a 1: 4 ratio of staff to children. It provides intensive stimulation (3 hours/day, 5 days/week, over an academic year) and training to small groups of children in motor, communication, social and cognitive development and children are enrolled by 2 ½ - 3 years. DEALL has centres in 7 Indian states.

INTERVENTION APPROACH

BEHAVIORAL ANALYSIS

ABC Paradigm can be very useful in determining behaviors that need to be modified. A represents antecedent, or stimulus before a behavior occurs; B is for the behavior or response to the stimulus; and C represents the result of the behavior. These ideas form an approach to behavior management called applied behavior analysis (ABA).

Applied behavior analysis (ABA) : Behavioral responses can be altered by manipulation of antecedent stimuli like environmental conditions such as explicit classroom rules or by manipulating the consequence that follows a behavioral response like teacher attention. The antecedent sets the stage for a specific response to occur, while the consequence changes the probability that the behavior will increase or decrease in the future. This is extensively used by SLPs globally, for management of ASD. (Alberto & Troutman, 1999)

Experience at ADI

Master Amir(Name changed) had severe tantrums which used to disrupt the activities of the entire school owing to the duration and severity and destructive nature but it was later identified based on the ABC paradigm that these used to be triggered by some antecedent such as the father not giving him quality time. Such antecedents were identified and Amir was trained by preparing him with repeated instructions to accept changes in situations likely to disturb him by explaining them to him by Special educators and SLP and caregivers, both prior to or at the time. Over a period of time, his tantrums reduced both in frequency and intensity.*

PRAGMATIC SKILLS TRAINING

The child with ASD basically communicates to regulate his environment for satisfying his needs but needs to be taught to communicate for seeking/ sharing new information; bonding; guiding thoughts.

At ADI: *As Amir* learned to communicate his needs more appropriately, his tantrums reduced thus highlighting that poor communication may trigger challenging behaviors.* ***Fig. 1*** *shows a session in progress where the SLP is encouraging motor imitation required in speech.*

TRAINING STRATEGIES

AAC- PECS

Some individuals may be unable to communicate via speech, or are unintelligible yet others do not understand that they have the power to "go first" in a communicative exchange.

The Picture Exchange Communication System (PECS™) was developed to target these difficulties at the Delaware Autism Program by Frost and Bondy (1985). The PECS Protocol has six phases from physical exchange of a picture to picture discrimination to finally enable commenting on interesting stimuli in the environment. The only prerequisite to PECS implementation is identification of a powerful reinforcer.

At ADI : *Master Amod* has very good social skills and attempts to communicate using gestures, eye contact and vocalisations with good intonation patterns. His attempts to imitate speech are characterised by articulatory groping behaviors* and dyspraxia cannot be ruled out.

Hence PECS was tried which has enhanced communication but is not yet used as an alternative to communication. The picture below depicts the SLP in a session teaching him to ask for a crayon using PECS.

Master Sahil, nonverbal, would communicate effectively by bringing to his mother, the containers with ingredients required to make a snack of his choice. This indicated keen observation and need based learning. PECS was indicated as a more effective means of communication. Presently PECS is being taught to many of the* non-verbal children in ADI.

Verbal children with ASD need guidance in discourse skills, as they frequently initiate conversation abruptly as one young adult with ASD, initiated conversation with, 'Do you like Anaconda?' They need to be guided by the SLP, to introduce topics with some background.

Children with ASD need special guidance in turn-taking behaviors and discourse skills, best taught through role-playing situations. Meal times are used by the SLP to observe feeding / swallowing issues and facilitate communication and turn taking behaviors. Fig. 5 shows the SLP bonding with child during mealtime at ADI .

Social stories also have been used with individuals with ASD to provide scripts for appropriate behaviors and social skills describing the typical characteristics of the setting to help them identify the relevance of the story to their experiences, relevant cues to attend to in challenging situations, and statements describing the thoughts, feelings, of other people . (Gray, 1995).

Experience at ADI: *Painting was Amir's * favourite activity and he used to paint or color on the walls of ADI and become angry if dissuaded, so the SLP used social stories designed for these situations which helped a lot in reducing these behaviors over time. He also was given a corner of a wall in ADI for his graffiti. Presently, his interest is being channelized into vocational training in painting diyas, pots and other craft items.*

Picture schedules and other visual supports can be used both to support an individual through a daily schedule of activities that may change somewhat from day to day and to illustrate a sequence of steps that need to be completed within a single activity (cited in ASHA www.asha.org/policy/).

Options to interventions are many, so too are the unanswered questions in the domain of ASD but a committed team, a caring caregiver with time can bring about commendable changes in children with ASD and an early start can help fuelling a positive change.

It is said that all of us respond to the beat of the drummer within us and God in His creativity has ensured that the drummer within each of us plays a different beat to which we best respond. So too is the case with the children with ASD. We may not be tuned to their unique beat and hence may not understand them.

The SLP is best suited to accept this challenge to try to blend into their unique world; understand their unique styles of communication and facilitate communicative strategies which will enable them to communicate as optimally as feasible with a group other than the immediate family.

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Stem Cell Therapy in Autism

There is a new revolution in the medical treatment of children with autism, a revolution that is taking the scientific and medical world by storm. A revolution that was awarded the prestigious Noble Prize in Medicine in the year 2012. A revolution that will forever change the worlds of our children with autism. This revolution is called Stem cell therapy.

Rationale for using Stem cell therapy for Autism

Recent advances in modern imaging using PET CT Scans of the brain has shown that there are selective areas in the brains of children with autism that are not functioning normally . Whereas rehabilitation methods and certain medications help in alleviating some symptoms of autism, they do not correct the root problem within the brain. Stem cell therapy by virtue of their actions of producing positive chemicals within the brain such as nerve growth factors, increasing the blood supply to these damaged areas and by converting into brain cells , initiate a process of repair and regeneration which addresses the very core of the problem. Stem cell therapy, therefore, produces clinical improvements, that were not possible with earlier methods. There are now published scientific papers in international journals that clearly show the safety and beneficial effects of stem cell therapy in children with autism (references listed at the end of the article).

As a treatment form, it is an extremely simple treatment, which involves the child getting only 2 injections (there is no major surgery involved) and has not been associated with any significant irreversible neurological complications.

In this article, we shall briefly discuss what stem cells are, how stem cells therapy is done and what are the clinical results of this form of treatment.

What are stem cells?

Stem cells are specialized cells, which can multiply manifold, can convert to any type of tissue of our body &have the ability to reach and repair damaged parts of the body.

What are the types of stem cells?

There are many types stem cells, but broadly they can be classified into 3 types:

- Embryonic stem cells,
- Umbilical cord stem cells
- Adult stem cells

- **Embryonic stem cells** are derived from the embryo or an unborn foetus. However there are many ethical and medical issues regarding its use. These are therefore not being used commonly at present.
- **Umbilical cord stem cells** are derived from the umbilical cord which connects the baby and mother at birth .Stem cells derived from the umbilical cord are stored by various cord blood banking companies. These stem cells do not have any major ethical issues surrounding their usage, however, availability can be an issue in different places.
- **Adult stem cells** can be derived from the same patient, from either the hip bone or the fat/adipose tissue. These are the safest and most popularly used stem cells at present and availability is not a problem.

  The advantage of adult stem cells are that, since they are derived from the patients themselves, there are no major side effects or complications associated with their use. There are also no ethical issues with regards to these. We use adult stem cells only and all further information in this chapter is based on adult stem cell therapy.

How is stem cell therapy done ? (at the NeuroGen Brain and Spine Institute)

This is done in 3 simple steps.

Step 1: *Bone marrow aspiration:* (done in the operation theatre)

This is done by putting a needle into the hip bone, after making the the area numb with a local anesthetic ,so that the child does not experience pain. 80-100 ml bone marrow is aspirated from the inside the bone. This takes about 20 minutes.

Step 2: *Stem cell separation* : (done in the stem cell laboratory)

The bone marrow removed from the child is taken to the stem cell laboratory, where the stem cells are separated from the remaining cells of the bone marrow. This takes about 3 hours.

Step 3: *Stem cell injection* : (done in the operation theatre)

A very thin needle is inserted into the lower back of the child, after making the area numb with a local anesthetic and the stem cells are injected into the fluid surrounding the spinal cord and brain(CSF).Around 50 million cells are injected this way. This takes about 20 minutes .

All the above are completed on the same day.

Clinical results of Stem Cell Therapy

Ninety one (91%) of all the patients, who underwent stem cell therapy showed functional and clinical improvements. The improvements were as follows: Hyperactivity reduced significantly, there was increase in eye contact and attention span, there was a decrease in abnormal behavior, violence reduced dramatically, communication improved significantly and their social interaction became much better.

There were also objective improvements in various assessment scales such as CARS,CGI, ISAA. In addition, in many of the patients, it was noted on the follow up PET CT Scans of the brain done after 6 months of the stem cell therapy ,that the areas of the brain which were damaged prior to the treatment had improved in their functioning.

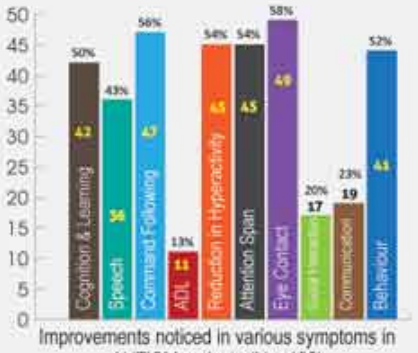
A detailed analysis of the improvements seen after stem cell therapy

Presented are the details of the improvements seen in 100 children with autism who underwent stem cell therapy. Out of these 91% showed clinical improvements.

Improvements in Autistic Children after Stem Cell Therapy can be broadly classified as

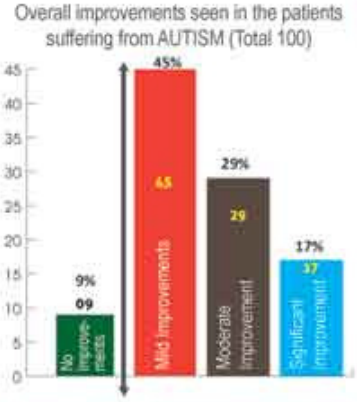
A) Clinical/Neurological improvements

There were reduction in abnormal stereotypical behavior, reduction in self stimulatory behavior, improvement in eye contact, attention span, speech, communication skills and social interactions (shown in graph).



Improvements noticed in various symptoms in AUTISM patients (N = 100)

(Percentage indicating symptomatic improvements)



- ***Hyperactivity, eye contact and attention span:***

Hyperactivity is one symptom, which improves most visibly. In 54% children, it was found that hyperactivity reduced significantly. This was , generally accompanied by improved eye contact along with improved attention span. This overall helped in training the child better. Child would now sit at one place for a longer time and respond to commands as well as teaching better. This overall resulted in enhanced school performance as well as understanding and cognition. It is also worth mentioning here that in those children who were on medications for hyperactivity, it was possible to reduce the dose of the medicines. This was done by the child's previous physician/pediatrician. There was no consequent increase in hyperactivity.

- ***Abnormal and Self stimulatory behavior:***

Almost 52% of the children showed reduction in abnormal behavior. Parents found that hand flapping, unnecessary laughing and crying, use of abusive language reduced. This lead to the children becoming more manageable. While 31 % showed reduction in self stimulatory behavior, equal number showed reduction or stopping of self injurious behavior. Violent behavior and aggression also reduced.

- ***Communication:***

After stem cell therapy, it was observed that communication improved in many of the children. This was both verbal as well as non verbal. One child with autism, who was almost non verbal and was extremely hyperactive, once he calmed down after stem cell therapy, started gesturing his needs. He also started verbalizing in bisyllables and small sentences. His overall communication about his needs as well as his emotions to his parents and sister improved remarkably. Overall, improvement in verbal communication was also noticed in 23 % of the children, with respect to improved speech and language communication skills.

- ***Social interaction:***

Along with a reduction in hyperactivity, attention to surroundings and awareness about surroundings also increased. This lead to improved social interaction, along with an increase in initiative for different activities, which hitherto , was not observed in these children. Overall, 20% of the children improved in their social interaction skills.

B) Improvements in the Objective Assessment scales:

Changes on Objective Assessment scales:

- All the children were scored on the ***ISAA (Indian Scale for Assessment of Autism) scale*** which quantifies the severity of autistic symptoms and enables the measurement of associated disability. The score was noted before and 6 months after stem cell therapy. There was a significant improvement in the scores after the stem cell therapy. There were some patients who also showed a dramatic change on the severity category. What is remarkable and worth noting is that 3 of these children went from severe to moderate autism, 8 went from moderate to mild and 1 patient changed to the non autistic category.

- Another scale used for monitoring the children is the ***Clinical Global Impression (CGI) scale.*** This is used as a clinical research tool to measure the severity of the illness along with the efficacy and response of the intervention/treatment in patients with autism. This scale also revealed improvement, when performed before and after the stem cell therapy, in terms of, the severity of illness and efficacy index. Thus, this indicated that the treatment was efficacious.

C) Objective improvements on SPECT/PET CT Scan Brain:

Most of the children with autism, have grossly normal brain morphology on MRI Scans of the Brain. However SPECT/PET CT Scan of the brain ,which shows abnormalities in brain perfusion / metabolism is now emerging as a useful imaging technique to identify the areas which are affected as well as the severity of the damage.

These imaging were done before the stem cell therapy and 6 months after the therapy. The clinical improvements as well as changes on the assessment scales, are also objectively corroborated by changes seen on the SPECT /PET CT scan of the brain.

An example below is a PET CT Scan brain of a child with autism before the stem cell therapy and 6 months after the stem cell therapy. It shows Increased FDG uptake (indicating improved metabolism and function) in the following areas : superior temporal gyrus, amygdala, fusiform gyrus (social brain) bilateral frontal, temporal, parietal and occipital lobes, bilateral cerebellar lobes, bilateral basal ganglia, hippocampus and parahippocampus (figure:PET CTScan).This correlates with reduction in hyperactivity, improved cognition, colour concepts, social interaction, awareness about surroundings, phonation, communication using non verbal means/gestures. Changes in objective assessment scales, such as, WeeFIM (From 58 to 65) and ISAA from 123 to 103) was also seen in the same child.

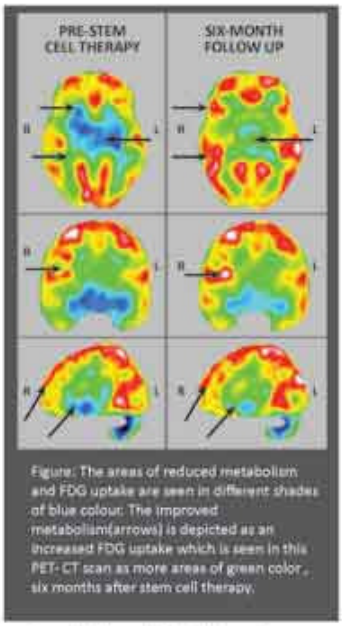


Figure: The areas of reduced metabolism and FDG uptake are seen in different shades of blue colour. The improved metabolism(arrows) is depicted as an increased FDG uptake which is seen in this PET- CT scan as more areas of green color , six months after stem cell therapy.

Discussion

Though, autism is a very complex neurodevelopmental disorder, different studies have also tried understanding the basic pathophysiology of autism or, in simple terms, why autism develops and what happens in the brain. It is understood now, that the neural hypoperfusion and immune dysregulation are the two key pathologies associated with Autism.

There is reduced blood flow supply to certain specific areas of the brain (**mesial temporal and cerebellum**), which in turn could be the cause of reduced functioning in this area. This coupled with an overall imbalance in the activity of the brain, is possibly responsible for the manifestations associated with autism.

Based on the above understanding, many scientists all over the world, such as, Ichim et al from USA, and Siniscalco from Italy (in various scientific reviews and publications) have strongly emphasized the potential of stem cells for the treatment of autism. These proposals are in view of the stem cells having strong angiogenic potential which could facilitate counteractive processes of improving perfusion by angiogenesis and balancing inflammation by immune regulation would exhibit beneficial clinical effects in patients with autism. Other contributing effects of the stem cells ,which have been proposed are, strong immunosuppressive activities as well as paracrine effects to stimulate neuronal function via growth factors, such as BDNF, VEGF,NGF AND PDGF.

Worldwide published scientific evidence & reviews on Stem Cell Therapy in Autism

The first ever clinical study published in the world to give clinical evidence of the role of stem cells in autism, has come out recently in August, 2013 from the NeuroGen Brain and Spine Institute, Mumbai. This is an open label proof of concept study of autologous bone marrow mononuclear cells (BMMNCs) intrathecal transplantation in 32 patients with autism followed by multidisciplinary therapies.

All patients were followed up for 26 months (mean 12.7). The outcome measures used were Childhood Autism Rating Scale(CARS), Indian Scale for Autism Assessment (ISAA), Clinical Global Impression (CGI), and Functional Independence Measure (FIM/Wee-FIM) scales. Positron Emission Tomography-Computed Tomography (PET-CT) scan recorded objective changes.

It was found that out of 32 patients, a total of 29 (91%) patients improved on total ISAA scores and 20 patients (62%) showed decreased severity on CGI-I. On CGI-II 96% of patients showed global improvement. The efficacy was measured on CGI-III efficacy index. Few adverse events were reported, including seizures in three patients, but these were reversible and easily controlled with medications.

Many scientists all over the world, have strongly emphasized the potential of stem cells for the treatment of autism.

The encouraging results of this leading clinical study provides future directions for application of cellular therapy in autism. The second study to be published is by Shenzhen Beike Bio-Techno logy Co., China , which studied the safety and efficacy of human umbilical cord mesenchymal stem cells (hUC-MSCs) and human cord blood mononuclear cells (hCB-MNCs) transplantation in patients with autism. This study comprised of 37 subjects diagnosed with autism, divided into three groups: ***CBMNC group*** (14 subjects, received CBMNC transplantation and rehabilitation therapy), ***combination group*** (9 subjects, received both CBMNC and UCMSC transplantation and rehabilitation therapy), and ***control group*** (14 subjects, received only rehabilitation therapy).

Transplantations included four stem cell infusions through intravenous and intrathecal injections once a week. Treatment safety was evaluated with laboratory examinations and clinical assessment of adverse effects. They used the Childhood Autism Rating Scale (CARS), Clinical Global Impression (CGI) scale and Aberrant Behavior Checklist (ABC) to assess the therapeutic efficacy at baseline (pre-treatment) and following treatment. They did not find any significant safety issues related to the treatment and no observed severe adverse effects. Statistically significant differences were shown on CARS, ABC scores and CGI evaluation in the two treatment groups compared to the control at 24 weeks post treatment ($p < 0.05$).

They concluded that transplantation of CBMNCs demonstrated efficacy compared to the control group; however, the combination of CBMNCs and UCMSCs showed larger therapeutic effects than the CBMNC transplantation alone. Other ongoing clinical trials worth mentioning ,on similar lines, are being carried out , in Mexico, Greece and Ukraine.

Conclusion

Stem cell therapy using adult stem cells combined with a holistic neurorehabilitation program has now emerged as a simple, safe and effective treatment option that improves many of their otherwise difficult to treat symptoms and improves the overall quality of their life. The functional improvements seen after stem cell therapy gives the children with autism a greater degree of independence thus helping them integrate into mainstream society.

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(Full texts of these articles are available at www.stemcellxpublications.com).

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The role of diet & nutrition

Nourishing Hope in Autism

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Are You Nourishing Hope?

Because body and brain are connected, you can improve or eliminate symptoms of autism by giving special attention to the food and nutrition children receive. There is no one-size-fits-all dietary program, each child is unique with individual biochemical needs and requires a unique bioindividual nutrition approach.

Autism spectrum disorders (ASD) are developmental disorders that affect children by disrupting their ability to communicate and interact socially. To reduce a child's symptoms of autism, parents often try alternative treatments such as specialized diets.

Lately, the ***gluten-free/casein-free diet*** has grown in popularity. A gluten-free/casein-free diet is also known as the **GFCF diet**. It is one of several alternative treatments for children with autism. When following this strict elimination diet, all foods containing gluten and casein are removed from the child's daily food intake.

An autistic child should have no processed foods at all in the diet. All foods should be as close to the way Nature made them as possible.

According to the results of a parent survey published in the journal Nutritional Neuroscience, parents reported that this diet was more effective if their child was also diagnosed with food allergies, had food sensitivities, or regularly experienced gastrointestinal (GI) symptoms. These GI symptoms are common in a subset of children with autism. For those who did not have GI symptoms, parents reported that the diet was less effective.

The benefit of a gluten-free/casein-free diet is based on the theory that children with autism may have an allergy or high sensitivity to foods containing gluten or casein. Children with autism, according to the theory, process peptides and proteins in foods containing gluten and casein differently than other people do. Hypothetically, this difference in processing may exacerbate autistic symptoms.

Some believe that the brain treats these proteins like false opiate-like chemicals. The reaction to these chemicals, they say, leads a child to act in a certain way. The idea behind the use of the diet is to reduce symptoms and improve social and cognitive behaviors and speech.

Another theory states that many children with autism have a "leaky gut," also known as increased intestinal permeability. This theory suggests that autistic children have tears and holes in their intestinal walls, possibly due to damage from toxins, antibiotic sensitivity or infections (such as an overgrowth of the yeast Candida albicans). In addition, these children may lose healthy digestive bacteria and have damage to the cells that produce enzymes needed to absorb certain proteins (such as gluten) properly.

Both leaky gut and problems with absorbing specific proteins, the theory goes, can cause intestinal contents to enter the bloodstream. This not only includes toxins and bad bacteria, but also protein molecules that haven't been fully digested. The latter may actually lead to food allergies because the immune system treats the molecules as foreign matter. It can also lead to what some autism researchers call the opioid effect.

Proponents of the leaky gut theory believe that the partially digested protein molecules from gluten and casein, also known as peptides, can reach the brain via the bloodstream. Peptides have a molecular structure similar to that of your brain's natural opioids (endorphins), so they're drawn to the brain's opioid receptors. This leads to problems with behavior, speech and social skills. Just as opioid drugs such as heroin are addictive, so are foods high in gluten and casein for children with leaky gut.

Children with autism often have trouble communicating, so they may not be able to tell their parents that they're experiencing painful symptoms like acid reflux and stomach cramps. Instead, they scream, act aggressively and throw temper tantrums. The discomfort, pain and other physical reactions from the allergic response could trigger autistic behaviors.

Some autism researchers have tested the urine of these children and found high levels of these peptides, which seem to support the leaky gut syndrome theory. A 2008 survey conducted by the Autism Research Institute showed that out of the 2,500 cases in which a gluten-free, casein-free (GFCF) diet was used in the treatment of autism, 66 percent of children showed improvement. Fifty-two percent of the more than 6,300 cases in which parents just eliminated casein also got better.

However, not all children with autism experience benefits from special diets. Although the GFCF diet is the most common autism diet, some parents take it a step further and remove other foods as well. Those who believe that yeast overgrowth can cause autistic behavior restrict sugar intake because sugar is food for yeast and encourages its growth. The yeast-free diet prohibits any fermented foods (such as vinegar) as well as any foods that may contain molds, like mushrooms.

Other Additive-free diets may remove artificial colorings, flavorings and preservatives because they can contain salicylates, a plant compound also found in some fruits and some types of diets eliminate artificial food additives, such as dyes, flavorings, and flavor enhancers like monosodium glutamate called Feingold Diet.

The connection between artificial colorings, flavorings and preservatives and behavior disorders isn't new (and has also been controversial).

However the Feingold Diet and the other additive-free diets actually targeted attention-deficient and hyperactivity disorder symptoms, rather than autism spectrum disorders.

To summarize, an autistic child should have no processed foods at all in the diet. All foods should be as close to the way Nature made them as possible. All autistic children have got faulty digestion, to minimize they should not be served protein and starch at the same time as they interfere in each other's digestion. Fruits with low glycemic index and vegetables should be given raw and fresh. Very simply, just four things need to be removed

- **Gluten** – the protein found in the wheat, rye, barley and oats.
- **Casein** – a protein in all mammalian milk and its products.
- **Aspartame** – group name to some artificial sweeteners.
- **Mono-sodium Glutamate** – a flavor enhancing chemical.

Collectively the avoidance of these four things is often just referred to as the GF/CF diet.

Medical Management of Autism

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Autism is a developmental disorder characterised by aberrant language development, impaired reciprocal social interactions and restricted behaviour repertoire. Apart from the above there are many associated problems. Seventy five percentages are mentally retarded and up to twenty five percent have seizures. Physical illnesses like upper respiratory tract infection, gastro intestinal symptoms like constipation and loose bowel movements, insomnia, feeding problems and enuresis are also frequently found.

The etiology of autism is found to be due to genetic factors, perinatal insults and neuroanatomical factors. There is increased size in the occipital, temporal and parietal lobe as compared to children without autism. High plasma serotonin is also found to be one factor.

No cure exists for autism, and there is no one-size-fits-all treatment. Rightly so, the management of autism is multimodal. As 75% of children are found to have mental retardation educational interventions are important. As there is a delay in language development, speech therapy is necessary for improvement of outcome. Sensory integration and social skills training are some of the other methods used. Medical management is also one of the modalities of treatment. While it is not curative, it helps to control symptoms especially of irritability, hyperactivity and self injurious behaviour. These symptoms may also interfere with other modalities of treatment and hence require treatment. This article would focus on various FDA approved medications for autism and those medicines prescribed as "off label to ease autism's disabling symptoms.

Different classes of medication used are:

- Antipsychotics
- Anti depressants
- Alpha 2 antagonists
- Stimulants & non stimulants

Amantadine
Donepezil, rivastigmine
Tetrahydrobiopterine

Antipsychotics

Antipsychotics are classified as typical and atypical. Typical antipsychotics like haloperidol are not preferred unless there are severe treatment resistant symptoms due to their adverse effect profile. Risperidone and Aripiprazole are the only two atypical antipsychotics approved for autism by the US FDA.

- ***Risperidone*** – has been approved by the FDA for the treatment of irritability in children with autism between ages 5 – 16 years. The symptoms that are reduced are tantrums, aggression, and self injurious behaviour. It is also effective in reducing stereotypic and repetitive behaviours. Most commonly encountered side effects with risperidone are weight gain, sedation and constipation. The dose varies from 0.5 mg to 4 mg.
- ***Aripiprazole*** – is approved by FDA for treatment of irritability in children with autism between age groups 6 – 17 years. Dose range is between 2-15 mg.The adverse effects weight gain, tremors, vomiting and sedation.

Other atypical antipsychotics used are olanzepine, ziprasidone, paliperidone, quetiapine.

Antidepressants

There is possible role of elevated serotonin in the blood in the etiology of autism. Reports have also shown possibility of abnormal maturational process of the serotonergic system. So the role of antidepressants with effect on the serotonergic system is relevant in the management of autism.

- ***Clomipramine***- is a tricyclic antidepressant. Used for symptoms of aggression, self injurious behaviour, repetitive behaviour and social relatedness. Dose is between 100 – 200 mg.side effects are seizures, weight gain, constipation, sedation and agitation. Due to the number of side effects the use is limited.
- ***Sertraline***- is a selective serotonin reuptake inhibitor. Dose range is between 25 – 50 mg.Symptoms showing improvement includes irritability, anxiety and need for sameness. Side effects are worsening anxiety and agitation.
- ***Escitalopram***- it is also a selective serotonin reuptake inhibitor. Symptoms responding to treatment are irritability. Dose ranged from 2.5 mg to 10 mg.
- ***Mirtazapine***- has both serotonergic and noradrenergic properties. The symptoms which show improvement are aggression, self injury, irritability, hyperactivity, anxiety, insomnia, depression and excessive masturbation. Dose ranges from 7.5 mg to 45 mg.Side effects are weight gain and sedation.
- ***Venlafaxine***- It is a serotonergic and noradrenergic reuptake inhibitor. Improvement is noticed in repetitive behaviours, socialization, communication and inattention. Dose range was between 6.25 to 50 mg.

Alpha-2 adrenergic agonists

- ***Clonidine***- it is an alpha 2 adrenergic agonist. Improvement is noticed in hyperactivity and anxiety. Dose ranges from 4 to 10 micrograms per KG per day. The common side effects are sedation, hypotension and fatigue.
- ***Guanfacine*** -It is an alpha 2 adrenergic agonist – improvement in hyperactivity, inattention and impulsivity was noted. Dose ranges from 1-3 mg.side effects are sedation and reduced blood pressure.

Stimulants & non stimulants

- ***Methylphenidate*** is an example of stimulant medication used. It is used in hyperactivity and inattention associated with autism. It is not as effective as in patients having only ADHD without co morbid autism. Dose ranges from 10 – 20 mg. Side effects like increased irritability, agitation, decreased appetite and weight loss, development of weight loss and psychosis are something to look out for.
- Non stimulant medication used in hyperactivity in patients of autism is ***Atomoxetine***.Dose is around 1.2 mg/kg body weight. It has the potential side effects of decreased appetite, irritability, fatigue and rarely hepatic dysfunction.

Mood stabilisers

- ***Valproic acid*** is used to treat children with autism. Improvement is seen in areas like aggression and repetitive behaviour. Side effects like nausea, vomiting, insomnia and headache can occur at therapeutic doses. Hepatitis and pancreatitis are serious side effects.

Other drugs : Amantadine, donepezil, tetrahydrobiopterine, rivastigmine are some of the other drugs used in autism. Medication in autism is required to reduce maladaptive behaviour seen in autism. It forms a part of treatment and is not the main stay of treatment. It is a target symptom approach. Risk benefit ratio of the drugs used should be done before starting treatment.

End note

Medicines for treating the three core symptoms of autism – communication difficulties, social challenges and repetitive behavior – have long represented a huge area of unmet need. Unfortunately, few drugs on the market today effectively relieve these symptoms and none of the options most often prescribed by practitioners work well for every individual. The good news is that the range of medication options may soon change, thanks to recent advances in our understanding of the biology that produces autism's core symptoms. This has made it possible for researchers to begin testing compounds that may help normalize crucial brain functions involved in autism.

Early experiments suggest that several compounds with different mechanisms of action have great potential for clinical use, and many are now in clinical trials. Although these developments are exciting and hold real promise for bettering the lives of people with autism, we will have to wait at least a few more years before we know if any of these drug studies produce enough information on safety and effectiveness to merit FDA approval for the treatment of core symptoms.

Neuro

Imaging in Autism

The Autism Spectrum Disorders (ASD), also known as Pervasive Developmental Disorders are a range of complex neurodevelopment disorders, characterized by social impairments, communication difficulties, and restricted, repetitive, & stereotyped patterns of behavior. Autistic disorder, sometimes called autism or classical ASD, is the most severe form of ASD, while other conditions along the spectrum include a milder form known as Asperger syndrome, and childhood disintegrative disorder and pervasive developmental disorder not otherwise specified (usually referred to as PDD-NOS). Although ASD varies significantly in character and severity, it occurs in all ethnic and socioeconomic groups and affects every age group. It is estimated that 1 out of 88 children will have an ASD.

Males are four times more likely to have an ASD than females.

The diagnosis of Autism remains a clinical conundrum. Criteria laid down in DSM-IV and ICD-10 may be quite clear to an experienced person. But it can be quite confusing for the average clinician or caregiver. However, in the absence of any specific diagnostic laboratory or imaging studies, a clinical diagnosis remains the gold standard.

Imaging in Autism

Since the brain tends to be grossly normal, anatomical imaging in the form of Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) do not provide any significant role in diagnosis.

Functional imaging in the form of Positron Emission Tomography (PET) provides an insight into the metabolism and regional activity of the brain. Though largely ignored until recently, it is now being considered as an option in the management of a person with ASD.

PET scans usually use a radiotracer called 18F-Fluoro-deoxy-Glucose (FDG). FDG is a radioactive analogue of glucose and is taken up by brain cells. On entering the brain cells, the molecules are metabolically trapped and can then be imaged thereby enabling visualisation of regional cerebral metabolism. Areas those are more active than regular show up as hypermetabolic regions while areas that are relatively inactive show up as hypometabolic regions. These images can then be interpreted individually or superimposed on corresponding slices of CT or MR images as fusion images.

Today's scanners enable acquisition of both CT as well as PET simultaneously (PET-CT) thereby providing both anatomical as well as functional information

PET-CT in Autism

Since autism presents as a spectrum, Positron emission tomography (PET) scanning has demonstrated multiple deficits in individuals with autism disorder; however, no single finding has characterized all people with autism. The results have varied from individual to individual.

Some people with autistic disorder exhibit increased glucose metabolic rate in the right posterior calcarine cortex and decreased

glucose metabolic rate in the medial frontal region, left posterior putamen, and left medial thalamus. Others have shown a generalised decreased glucose metabolic rate in the bilateral frontal, temporal and cerebellar regions.

The variations in presentation prevent the emergence of a definitive pattern to enable the diagnosis of autism. However, prognostication of the child's behaviour is possible.

Another role that PET can play is in the evaluation of treatment response. A baseline PET is acquired followed by the treatment of choice. A repeat brain PET is acquired after an interval period and metabolism assessed. Quantification can then be made of the improvement or deterioration in cerebral metabolism. PET would be able to assess whether the child is responding to a particular line of treatment or not. In case of response, further cycles of the treatment or modifications can be planned.

Serial PET scans can monitor the progress of the child over time. Along with clinical parameters, PET can help in the assessment of the neurological development of the child and ideal environmental stimuli can be isolated thereby ensuring optimal growth.

Limitations

PET findings are as diverse as children with autism are. There is no characteristic pattern identified so far to enable a definitive diagnosis of autism.
Also the absence of a standardised neurological PET database prevents the comparison of regional metabolism with a normal population. The solution to this lies in the baseline scan. A baseline scan acts as a control against which all subsequent scans can be compared. Since the child is his own control, any deviations can be easily assessed.

Quantification of these deviations can then be compared with clinical improvement or deterioration.

Conclusion

A baseline PET scan can help in prognostication of the child's behaviour. Serial PET scans can monitor the progress of the child over time. Along with clinical parameters, PET can help in the assessment of the neurological development of the child and ideal environmental stimuli can be isolated thereby ensuring optimal growth.

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Aquatic Therapy & Autism

a clinical perspective

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The sweet smile, mischiefs, the innocence, plenty of questions and the naughty answers are some of the characteristics that makes us love and adore children. The commitment of the mother to her baby is unbeatable in all species and humans are no exception. She is one person who will love her child unconditionally and would go to any lengths to see her child grow normally. Father plays the most supportive role in this entire process and is most elemental in shaping the growth of the child. Little less expressed but he considers it as a serious responsibility for making his child make an independent living individual. When there is a problem with their child, Parents face the harsh truth and start searching for solutions pillar to post. Every time there is something new that is put up somewhere or somebody tells them some technique is good, they would want to try it and believe there will be a magic happening. Autism is such a disorder that has a blend of, social incompatibility, sensory, and possible behavioral, physical and cognitive issues. The child faces several challenges when participating within the society as an individual.

A specific line of treatment cannot be predesigned and there has to be some mix n match with various individualized approaches. Water, in this line of thinking has one unique property it accepts all with no discrimination, rich or poor, able or disable. For a child with Autism it can become a small world in itself where they can peep out of the window through therapy and slowly work through their limitations. This issue of PHYSIOTIMES will put a thought about using water as another mode of approach to Autistic Children.

Autism Spectrum Disorder (ASD) would have had many descriptions and definitions in some of the articles written here. So we will directly approach the problems. It is a disorder that causes impairment in functioning due to deficits in social and communication skills, and repetitive and restricted behaviors. These present as difficulties in forming and maintaining social relationships. These individuals may be highly dependent on routines and structures, have restricted interests and may have difficulty processing and integrating sensory information. Individuals with autism may also present with severe anxiety, low tone, and difficulties in motor co-ordination and motor planning. These children may also have poor physical fitness. This further limits their social participation.

Traditionally aquatic therapy is viewed as useful for individuals with physical involvement. However, it can be a wonderful adjunct to the more traditional therapies like sensory integration or behavior therapies for children on the spectrum. The physical properties of water are natural therapeutic resources that aid in working on several areas of dysfunction for individuals on the spectrum. The properties such as buoyancy and up thrust provide unique opportunities for movement that may not be available on land due to motor planning or coordination difficulties. These also provide opportunities for vestibular input that many children on the spectrum with sensory processing difficulties may be seeking. The movement of the body through resistance because of viscous properties of water and hydrostatic pressure when immersed at the level of chest allow for deep pressure and proprioceptive input. These are known to have calming effects on children with autism and sensory concerns.

Water is in a state of constant movement, this can be utilized to influence arousal levels in children with low arousal. However, this can also very unsettling in the initial stages for children that have a need for a rigid structure. Children with tactile defensiveness especially around the face and lips may have initial difficulty tolerating the light touch because of water splashing, but the tolerance improves as the session's progress. Children on the spectrum generally rely heavily on their visual systems and they may not get visually accurate information about their space and body position because of water refraction. Prior preparation and visual schedules or cues can help to prepare the children overcome these initial difficulties.

When in an outdoor pool, the temperature of the pool will also be an added factor for consideration especially for children that are non-verbal and the therapist will have to watch closely or come up with a sign or visual picture card that is pre-decided when the child wants to come out.

Water can be a fun medium for children and when therapy is done as a group, it can be wonderful medium for social interaction and social skill development. This also allows planning for social games, fine motor games and working on motor coordination and praxis for children on the spectrum. Many children on the spectrum also love being completely submerged under water and enjoy the pressure around their body when submerged. This allows opportunities for underwater games including visual motor, motor planning and motor coordination.The therapist working with these children should use this intrinsic motivation of the child, but also teach the child sufficient skills for breath control and recovery so that the child is able to stand up and bring their head out of the water when needed.

When designing an aquatic therapy program several factors will need to be considered. Autism is a spectrum disorder and the extent to which each individual is affected in different areas of functioning may vary. This means that aquatic therapy intervention will also need to be as unique as the individual on the spectrum. Because of the highly individualized characteristics of children and adults on the spectrum, designing an aquatic intervention program for a larger group presents an exceptional challenge. The individual goals will have to be incorporated as part of the larger group goals. The primary consideration should be to design a program with a goal specific to improve their functioning in the community. We can allot some target goals and look at working them at an individual level and later integrate them as a whole in the activities: The major goals are:

Social: Improvements in social skill development i.e. turn taking, sharing space, sharing toys and equipment;

Motor: Muscle strength, gross motor, fine motor and oral-motor skills for improved participating in school, group sport etc.

Sensory: Vestibular, proprioceptive and praxis for improved participation at home, school, workplace etc.

Behaviors: Rigidity in behaviors, inflexibility, stereotypical movements.

Water safety skills and **pre-swimming/swimming skills** as a precursor to independence in leisure pursuits and eventual community integration.

ADLs/IADLs: Participation in an aquatic therapy program requires several steps leading to it such as organizing and packing the bag, changing into swimwear and showering before and after the session. These can be all included as goals for a child on the spectrum.

Carrying out an assessment prior to taking the water to the child will gives us enough knowledge to decide on what goals are we going to work.

The pre and postassessments utilized will be specific to the goal. When doing therapy as a group with improvement in social skills, social skills rating scales or checklists can be used to measure pre and post levels. For motor based goals, Peabody developmental motor scales or Bruininks Oseretsky Test of motor proficiency can be used. For sensory based goals, the sensory processing measure or clinical observations based on sensory integration theory can be used. Behaviors can be measured by taking ongoing data with checklists. To measure water safety and pre-swimming / swimming skills, the WOTA 1 and 2 and Halliwick assessment can be used. For ADLs/IADLs, scales such as WeeFIM, PEDI or Independent Living scales (ILS) or other checklists can be used.

The evidence from research will have to be accepted cautiously as the therapy protocols are different and due to existence of extreme differences in individuals with ASD, the therapist wanting to utilize aquatic therapy as an adjunctive treatment needs to have a clear and specifically defined goal. The pre and post-test utilized should be contingent on the goal for the aquatic program as mentioned above. The time duration for the aquatic program should be pre-determined. Ideally an aquatic therapy program for ASD should be for about 2-6 months with a frequency of 1-3 times per week. Documenting the qualitative changes along with the post test is also paramount in determining the success of the aquatic program. The techniques of aquatic therapy utilized must be goal dependent, for example use of Halliwick therapy and ten point program for the social, motor, sensory and leisure goals. Watsu plays a role in reducing anxiety and overall hyperactivity for children with ASD while BRRM can be utilized if the child has motor difficulties or if strengthening is required. Generally, a combination of treatment techniques like the ones mentioned along with aquatic games in the same session can be utilized to achieve the desired results for any of the above goals.

The current evidence for benefits of aquatic therapy in Autism is preliminary and limited. The early evidence comes from a case report of a 9 year old child suffering from Autism treated with a 10 week long aquatic therapy program primarily based on Halliwick concept which showed improvement in physical fitness parameters like balance, speed, agility, cardio respiratory endurance and muscle strength, endurance and power. It also showed reduction of repeated stereotype motor mannerisms. This was followed by a survey of the perception of Occupational therapists about the benefits of aquatic therapy in Autism. Eighteen therapists participated in this study and unanimously agreed that there is significant improvement in tolerating touch and maintaining eye contact post therapy.

When further tested with non-randomized controlled trials they too showed similar results. Four non randomized controlled trials unanimously showed beneficial effects of aquatic exercises over normal treatment methods in aquatic skills and safety, cardiovascular endurance (Ability to perform activities in the target heart rate zone for a longer time), muscular strength and endurance and social skills. One of the trials showed reduction in antisocial behavior and repeated motor mannerisms; the other showed increased functional mobility of children and greater satisfaction of the parents with use of aquatic exercises.

The available evidence is therefore clinically significant in identifying the benefits of aquatic therapy in autism to improve motor skills, social and behavioral skills and physical fitness. The strongpoint of all these trials was use of relevant and standardized outcome measures. However, the results cannot be generalized over the spectrum as participants in all of the above mentioned trials were small in numbers, categorized as high functioning autism or Asperger's syndrome between the age group of 4 to 12. The long term carry over effect of the therapy has not been tested. The exercise programs lasted for a maximum of 14 weeks and a carryover effect was also measured for the same duration. Therefore there is a need to design and conduct trials with rigorous methodologies, that will help explore the effects of aquatic therapy over the complete spectrum of autistic disorders, in children as well as adults and establish clinical as well as statistical significance.

In summary, as discussed, the versatility of water allows for a large variety of goals that can be achieved with children on the spectrum. The distinctive characteristics of this condition have to be considered when designing and implementing an aquatic therapy program for this population. It is important to test the skills on land pre and post intervention, to document the clinically relevant changes.

With appropriate understanding of the kids on spectrum, clear planning of protocols in aquatic medium and some creative thinking will help therapists and autistic children to use water as a medium for a wholesome development. The benefits of water are known and the clients requiring them are present, it is upon us as therapists that we bridge them. Let us begin.

Additional Reading

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Yoga as a therapeutic modality in Autism Spectrum Disorder

The ancient art of yoga is proving to have great benefits for children on the autism spectrum. Yoga comprehensively addresses their heightened anxiety, poor motor coordination and weak self-regulation, something that otherwise is very difficult to do.

Treatments for autism come in all shapes and sizes, and as families well know, what works for one autistic person doesn't necessarily work for another. Choosing an intervention must be based on an autistic individual's specific needs and the family's emotional and fiscal comfort. An increasingly popular choice which is gaining a greater foothold in the scientific community is Yoga. It doesn't require expensive medications or time- consuming doctor's visits. Once learned with the guidance of a specially-trained instructor, it's a simple movement and breathing activity that researchers say can have far-reaching physical and psychological effects. In fact, a wide range of people on the spectrum can practice yoga, even at home, with limited supervision and with little more than an exercise mat.

Largely in response to parental demand, more yoga teachers than ever before are getting trained to teach classes specifically adapted to students with autism. And in contrast to past years, when most of these students were young, Yoga-For-Autism classes are increasingly geared to older teens and adults. Moreover, there's a growing recognition that yoga, to be truly effective, must be specifically geared to the unique needs and healing potential of those with ASD.

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Sceptics in the medical establishment may question the helpfulness of yoga, but Manner at the Comprehensive Autism Medical Assessment and Treatment Centre states that her experience and that of other pioneering yogis already offers powerful evidence that yoga "works." Yoga can be just simple laughter or a smile, "It's about connecting with the self. In this sense, "To be in the moment".

Many children on the autism spectrum have difficulty processing and organizing sensory input from their nervous systems. Traditional therapy techniques for autistic children tend to use external techniques of sensory integration, providing stimulation to the tactile (sense of touch), vestibular (movement and gravity) and proprioceptive (awareness of one's body in space) systems.

As "A Physioyoga Therapist" I believe Yoga is a promising therapy for autistic children. Yoga improves sensory processing and enhances one's sense of personal space, improves gross motor skills and the ability to transition from one activity to another, develops self esteem, and improves communication and relationship skills. In contrast to other therapies, Yoga helps autistic children "TO CALM THEMSELVES"

The first step in teaching Yoga to a student with autism is to establish a strong bond with the child. To do this the Yoga teacher will need to enter the world that the child lives in -- to meet the child on his or her own level, so to speak. Only then will the teacher be able to gain the child's complete confidence.

Yoga Postures for Autistic Children

The Postures may be started very slowly and one posture may be practised at a time otherwise the child may get irritated too.Yoga Postures should be practised on a "Sticky Mat". The sticky Mat is to make the child feel that his/her feet are stable in the Yoga Poses. The child should not feel

The children should not wear socks while practising Yoga poses as this will not provide the needed stability. The child should wear loose, light and non binding fabric cloths.

The postures should be practised regularly and best advice is at least three times a week. Short sessions of 10-15 minutes are better with frequent repetitions rather than long sessions as child may not be able to concentrate and get frustrated easily. Consistent practise will increase child's energy levels, concentration, attention, endurance, stamina and coordination.that "I will slip off or slide on the mat" while practising.

Anytime of the day is appropriate for the child to practise yoga as far as the interest level is maintained. But the same time should be chosen everyday for the sessions

Each pose is geared to relieving stress and pressure in the "autonomic nervous system," It is "easy to teach and easy for children to remember."

After the student becomes familiar with these introductory poses, the Yoga teacher may progressively add more asanas to the routine, as well as deep relaxation. The combination of asanas, pranayama and deep relaxation will strengthen the child's nervous system, increase overall health and facilitate the development of body awareness and concentration.

The Breath of Peace (Yogic Breathing)

The Breath of Peace is repeated throughout the session, sometimes between poses, to bring the children back to a calm and centred place.

Yogic Breathing Exercises have a great influence in taking care of psychological issues in autistic children. Yogic Breathing exercises are breathing deep down into the belly rather than just shallow breathing in the chest.

Instruction: There should not be breathing like a super hero-"Chest in & out", but instead it should be as "air filling into the belly" with inhalation and "air squeezing out" of the belly in exhalation.

Meditation

Practise of "Shwasan Dhyan"(Breath Watching Meditation) & Reverse Counting Meditation have proven to be of great interest and fun to the children which helps in relaxation and calming down.

Technique: Sit in easy pose with a tall straight spine, the hands gently placed on the thighs with the palms facing up to the sun, eyes closed. Bring your focus to the centre between the eyebrows and slightly above. See a beautiful light within. Breathe in slowly and quietly through the nose, feeling the breath flowing all the way up the body until it reaches the top of your head. Then slowly and gently release the breath through the mouth, feeling peace and Calmness throughout the body, specifically intended to help children contend with their escalating emotions.

How is Yoga good for Autistic Children?

▪ Yoga develops motor skills

Kids with autism frequently experience delayed motor development, which can be improved as yoga tones muscles, enhances balance and stability, & develops body awareness and coordination. As motor skills develop, children have a greater sense of their physical self in space and in relation to others, and can improve their gait and stability.

▪ Yoga improves confidence and social skills

Poor coordination often yields low self-esteem as kids may be singled out or teased for not moving or behaving like other children, or not excelling in sports and outdoor activities. By learning self-control and self-calming techniques through yoga, they are likely to grow confidence in interacting with other children and refine their social skills.

▪ Yoga provides sensory integration

Children with autism often suffer from a highly sensitive nervous system and are easily over stimulated by bright lights, new textures, loud noises, strong tastes and smells. Yoga's natural setting of dim lights, soft music, smooth mats, and "inside" voices creates a comforting environment largely protected from unknown or aggressive stimuli in which calming down becomes enjoyable. Yoga's physical poses allow nervous energy to be released from the body in a controlled manner, also leading to a calming sensation.

▪ Yoga provides coping techniques to both kids & parents

Whether teaching the child breathing techniques for self-calming, talking the class through a guided visualization the child can use when getting anxious, or sharing flashcards of the day's poses with parents to use at home, yoga provides an awesome toolbox to parents and siblings. It is a transportable practice that both parents and kids can draw from for a lifetime and share a meaningful home activity.

▪ Yoga facilitates self-awareness

Yoga is particularly instrumental in helping kids with autism learn self-regulation. By becoming aware of their bodies and aware of their breathing, yoga provides them with the ability to cope when they start to feel anxious or upset. Many 'Yoga for Autism' classes teach yoga poses or breathing techniques specifically intended to help children contend with their escalating emotions. Since these children are visually oriented, savvy instructors add a visual element so that the child has a colour picture of each pose near his or her mat.

▪ Yoga engages the emotional brain

We all know that yoga is far from purely physical, and this combination of movement, music, breath work and storytelling activates the brain's emotional region. This encourages children to develop awareness of their emotions and those of others, as well as keeps their attention in the class. Music is another powerful tool that the yoga instructor can share with parents to use at home to recreate the environment of a yoga class.

▪ Yoga is orderly & consistent

Ideally, the class will be scheduled at the same time and same day of the week, with the students' mats in the same layout, in the same room, with the same instructor(s) to impart a sense of trust and steadiness. This element of order is very important for a child and communicates stability. The class should have an opening and closing routine or practice - singing, tuning in, etc. - that further supports the students' need for order.

Yoga is not competitive, but practise of some yoga poses can stay with the child for lifetime. Yoga as a complimentary treatment for autism is growing in popularity. A new book by South Florida yoga teacher Louise Goldberg provides techniques for teaching yoga poses to children with special needs. Titled "Yoga Therapy for Children with Autism and Special Needs", published by W.W. Norton and company, this book offers ways to present poses and structure a class for children with autism and other special needs. In contrast to other therapies, Yoga helps autistic children calm themselves, rather than relying on someone else to provide this comfort for them. . By establishing optimal physiological and psychological integrity, Yoga therapy helps children with autism gain new motor, communication and social skills. The end result is an overall improvement in their quality of life.

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A MOTHER'S JOURNEY OF HOPE & CARE

Raising a child with Autism

The shock of finding out that their child has autism is life-changing for most parents. Raising a child with autism is a constant challenge, and being a mother of such a child is an exhausting, exhilarating, and lonely roller coaster ride. It is difficult to paint a portrait of what it's like to manage the day-to-day life of a child with autism, but here we offer a realistic view of parenting a child with special needs, in the words of Mrs. Salunkhe, a mother of an eight year old boy, Vaibhav, who has autism.

When Vaibhav was born, he was a normal child, with all the normal milestones. We were very happy, our family was complete. But sadly, fate had something else in store for us. As Vaibhav started growing up, we began to notice abnormalities in his behavior. He wasn't like other children of his age. Our elder daughter had shown all the development milestones at appropriate ages. But Vaibhav was growing up differently. He would cuddle and sleep by himself, while walking he wouldn't place whole feet on the ground. He would cry frequently, sleep all through the day, stay awake at night and would stare at the ceiling fan and start yelling. As a mother, it was very hard for me. He wouldn't recognize me and wasn't even emotionally attached to me. It was extremely difficult for us to understand his temperament, he wouldn't understand us either. Eventually, we consulted doctors and Vaibhav was diagnosed with autism. Coping with this became very hard. Our elder daughter had grown up as a normal child, so all this was very new and abnormal for us.

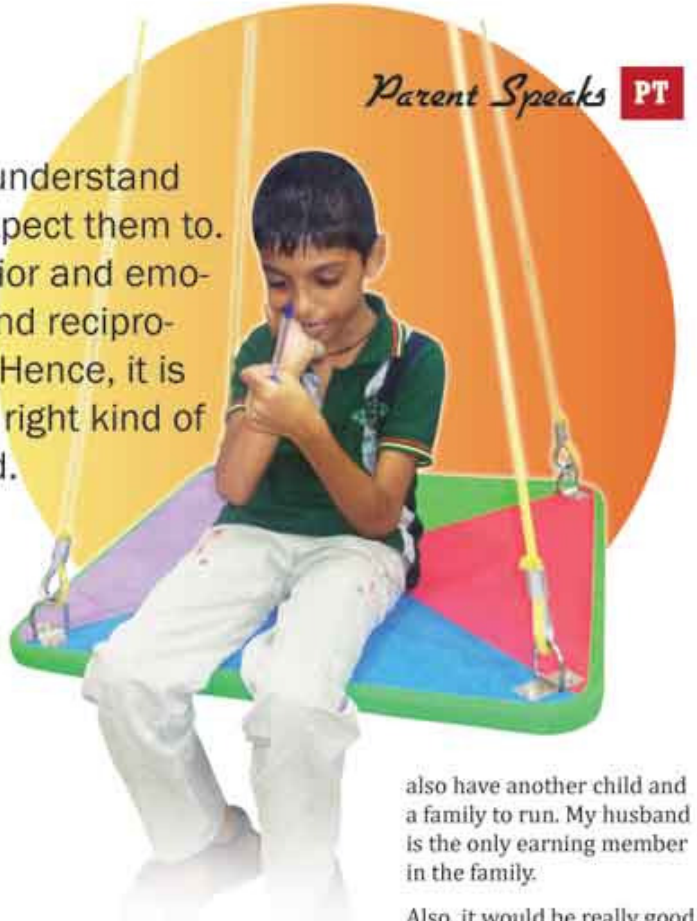
But slowly, we came to accept it and tried to focus on things which will help Vaibhav. He started rehabilitation therapies and this lessened his erratic behavior.

One day, while watching a TV programme, we saw Dr. Nandini of NeuroGen Brain and Spine Institute giving information on stem cell therapy and its use in treating autism. We immediately contacted the doctors and asked for more information. We consulted many people; all of them dissuaded us from opting for the treatment. But my husband and I had a belief that this therapy would make our son better. We wanted to try everything that may be able to help Vaibhav. It was a ray of hope for us and we were determined to make the best of it. With this faith, we got Vaibhav admitted in NeuroGen in July 2012 for stem cell therapy. All through the treatment, in my heart, I was constantly thinking about Lord Ganesha on one hand; and Dr. Nandini on the other.

After undergoing stem cell therapy for the first time, we noticed that his overall awareness had started improving. He had begun to notice people entering into the room; which earlier he wouldn't do. He had started handling objects in his hand, used to not get cranky during the therapy sessions. His overall participation in the therapy sessions had begun to improve.

After second round of stem cell therapy, we experienced something very interesting. One day, Vaibhav came home from school, crying inconsolably. I tried to console him, confront him; but to no avail, I was unable to pacify him. Since he had difficulty in speech and expressing in words I handed a blank slate to him and asked him why he was behaving like this. Then, to my surprise, he described an incident that had occurred in school, writing it on the slate in 4-5 line. I contacted his school teacher who confirmed the same. This was wonderful news to me! I was overjoyed that my son was at least able to explain his worries and explain his feelings, in some form of communication. After that day, I started communicating with him, regarding food, his needs, his temper tantrums, etc by writing on the slate. I could understand my son much better and even help reduce his worries. Gradually, because of this new found understanding, his irritability and temper tantrums decreased. This was, undoubtedly, a welcome change for us.

Children with autism understand more than what we expect them to. They sense our behavior and emotions towards them, and reciprocate correspondingly. Hence, it is important to have the right kind of therapist for your child.



He also wrote that, suddenly he would experience unpleasant sensations in his hands- sometimes hot or cold flushes. He also conveyed tingling sensation in his hands. By his writings, I began to understand his improved level of awareness about himself. With time, even his physical abilities began to improve. Even though he was slim, his overall balance and walking, sitting and standing started becoming more refined.

He himself devised a strategy to curb his hyperactivity. He would make his sister cycle around while he would run behind her for two hours. After doing this, he would be tired and would sleep peacefully after that. I was simply awestruck by his behavior. He even conveyed that he wanted to undergo stem cell therapy for the yet again by means of writing on a black slate.

After the 3rd treatment, his condition became even better. Eye contact, cognition, eating habits, awareness, etc. also improved.

Rehabilitation is very necessary. There are 2 kinds of therapists- one who believe that there is no hope, nothing can help your children. It is very de-motivating and discouraging to be around such people. On the other hand, there are some therapists who help you see the positive side, who take the effort to understand the different mindset of your child and show you how to overcome it. Children with autism understand more than what we expect them to. They sense our behavior and emotions towards them, and reciprocate correspondingly. Hence, it is important to have the right kind of therapist for your child.

It is very difficult to bring up a child with autism and especially without any support from the government. Raising a child with autism not only needs patience, persistence, time but it also requires money. We especially face a problem as there is no provision from the government and we have to pay tax. We not only spend money behind the child, his medical expenses, different types of therapies that he needs but I also have another child and a family to run. My husband is the only earning member in the family.

Also, it would be really good to have gardens designed for children with special needs. Currently, the gardens are very overcrowded. Hence, with more gardens, our children will be able to play and connect with the world would also be therapeutic for him.

We, as parents know that neither our doctors nor we can give him a hundred percent normal life. But I feel satisfied that, I now understand my son a lot better. It would be my advice and request to all other such parents, who are caring for their autistic children, to try to understand their child. It is important to accept your child's differences, understand what these differences are and help your child in whichever way possible.

Vaibhav has come a long way, showing many improvements. We are very relieved, happy and are extremely grateful to all the doctors & therapists of NeuroGen.

Recent Advances in Autism

Role of Hyperbaric Oxygen Therapy, Chelation, Vitamin B12 therapy

Will HBOT help my child with autism? Are there any risks or side effects to watch out? Can I try HBOT, since nothing is working for my child? .....a therapist may often face such queries of parents of children with autism who are constantly searching for options, in a hope to improve their child's condition. Though not a cure, many new alternative therapies are being developed for autism over the past few decades due to the increased understanding of its pathophysiology. A therapist should be aware of the availability of novel therapies and their potential side effects. Here, we discuss recent findings on hyperbaric oxygen therapy (HBOT), chelation and vitamin B12 therapy for autism.

What is Hyper [high] Baric [pressure] Oxygen Therapy (HBOT)?

Hyperbaric oxygen therapy (HBOT) is a treatment which involves application of 100 percent oxygen at higher than normal atmospheric pressure intermittently to the body. In the ambient atmosphere an individual breathes approximately 20 percent oxygen and 80 percent nitrogen. While undergoing HBOT, in a chamber, the pressure is increased up to two times combined with an increase in oxygen to 100 percent. This dissolves the oxygen in the blood plasma and in all body cells, tissues and fluids at up to 20 times normal concentration which promotes faster and more efficient healing.

Use of HBOT was first documented in 1662, where a British physician implemented it to treat a pulmonary disease. The first hyperbaric oxygen chamber was built in France in 1834. (1) Since then, HBOT has been used to treat a variety of conditions such as stroke, traumatic brain injury, crush injury, and cerebral palsy [2] Recently, its use for treating individuals with autism has also increased.[3]

How is the Procedure of HBOT done?

It is important to increase the pressure inside the chamber slowly and also carry out the decompression slowly. The patient is on a table that slides into the transparent chamber which is about 7 feet long. Children can be accompanied with a parent and can play or drink inside the chamber. One can see and talk to the technician at all times. The chamber is sealed and filled with 100% oxygen and pressure is increased to 2.5 times the normal air pressure which may cause some ear popping or mild discomfort. The session will last anywhere from 45 minutes to one hour. At the end slow decompression of the chamber is carried out to avoid decompression sickness. Usually, 40 hourly sessions are conducted.

What are the Contraindications? (for children and their parents):

Absolute: pneumothorax and severe congestive heart failure. *Relative:* History of seizures, febrile illness (lower threshold for seizures and prolonged removal time due to slow decompression incase of an event), recent ear surgery, chronic sinusitis, active upper respiratory infection, (due to inability to equalize the ear pressure). Asthma, emphysema (lung barotrauma), congenital spherocytosis (fragile RBCs), claustrophobia (anxiety), optic neuritis (blindness), active cancer, pacemaker and pregnancy. [4]

How does HBOT exactly work?

In autism, the pathogenetic mechanisms postulated are cerebral hypoperfusion, inflammation, oxidative stress, and immune dysregulation. Studies have shown that

children with autism may have decreased blood flow through the social brain (mesial temporal, amygdala, etc). Less blood flow results in decreased oxygen supply to these areas. The chances of the hypoxic tissue to receive more oxygen increases by enhanced supply. HBOT not only increases the oxygen in the blood but also allows the oxygen to effortlessly cross cell membranes and enter all of the other body's fluid systems.

This cumulatively improves the transport of oxygen in the body. It stimulates angiogenesis, reduces oxidative stress by stimulating superoxide dismutase, reduces inflammation and stimulates local stem cells. This improves the neuronal functions. HBOT thus reverses the neurological abnormalities. [5,6]

Clinically, this leads to improvement in cognition, socialization, language, behavior, eye contact, etc in children with autism. [7]

Are there any Clinical Studies?

Previously several uncontrolled studies, have shown HBOT to be a safe alternative therapy for autism. These results have been further strengthened by the results demonstrated by a controlled study carried out by Rossignol et al. 80% of children in the hyperbaric treatment group had an improvement on the Clinical Global Impression (CGI) scale for change in overall functioning as rated by blinded physicians. On the Aberrant Behavior Checklist (ABC), significant improvements were observed in the treatment group in total score, irritability, stereotypical behaviour, hyperactivity and speech [9] But, the randomized controlled trial carried out by Sampanthavivat et al including 60 Thai children, did not support the previous studies' findings. [9] Hence, further robust research is required to prove the benefits of HBOT in autism.

What should we watch out for? (Complications):

One should be vigilant for possible complications of HBOT, that includes barotrauma injury (to middle ear, nasal sinuses, inner ear, lung, teeth), oxygen toxicity (central nervous system, lung), confinement anxiety, and ocular effects (myopia, cataract growth) and seizures. [10]

Warning:

Currently, FDA has not approved autism as an indication for HBOT and it's use is off label. Thus, one needs to be cautious while considering this option.

Chelation Therapy..does it work for autism?

Chelation is a process of removing heavy metals from the blood and is recently being used in treatment of autism only if associated with heavy metal toxicity. Heavy metals like cadmium, mercury and lead have been found in high levels in some children with autism. [11] The underlying mechanism of chelation includes elimination of these toxic metals leading to improvements in children with autism. Chelation involves a series of injections, Dimercaptosuccinic acid (DMSA) or Ethylene-diamine-tetra-acetic acid (EDTA) which binds with the heavy metals and is subsequently excreted in the urine (to be monitored). [12] The procedure should be carried out only after confirmation by lab tests and by an experienced doctor. Two studies with DMSA illustrated high excretion of heavy metals and improvements in language, cognition, and sociability. [13,14] But, chelation therapy lacks substantial evidence and is also associated with severe adverse effects like renal and hepatic toxicity, fatigue, and diarrhea, seizures etc. This treatment is not standard of care in autism and may be even dangerous if not performed carefully.

Injectable Vitamin B12 (methylcobalamine).... Are these required?

Due to poor dietary intake, poor absorption, or metabolic abnormalities, some children with ASD may develop deficiency of vitamin B12. This can lead to decreased antioxidant capacity. As we all know, antioxidants are essential to protect our cells against the damaging effects of free radicals. Therefore, some have attempted vitamin B12 injections for autism. One published study in children with autism suggests vitamin B12 to be ineffective in treating the behavioral symptoms. However some symptomatic relief was seen in a subgroup of children.

Additional research in this area is warranted. Since it is administered via injections, it falls under the not recommended category of drugs.[6] If there is documented lab test of vitamin B12 deficiency in a child, then one can understand it's use for replenishing the deficit, but not otherwise. High levels of vitamin B12 may even lead to toxicity symptoms.

In conclusion, none of these therapies offer definitive treatment for autism. There are several critical views about chelation, thus warranting a cautious approach. Injectable vitamin B12 is not recommended for symptoms of autism. Though not FDA approved, HBOT has mixed reports and it's potential needs to be explored by further research.

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> I regard the theatre as the greatest of all art forms, the most immediate way in which a human being can share with another the sense of what it is to be a human being
>
> – Oscar Wilde

Autism Spectrum Disorder Through Drama Eyes

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Drama therapy programs can play a crucial role in the development of an autistic young adult's self esteem and social skills. They can provide a fun yet challenging environment in which all kinds of relevant expression is allowed and encouraged.

In the first week of April 2013 a couple visited Velvi Centre for Autism with their 2 years old baby, diagnosed as ASD by NIMHAANS Bangalore. The Child had no eye contact, no communication and also had vestibular issues. The same child today has greatly improved Eye Contact, some basic words and she is able to now walk a few steps. She is happily playing with one of her cousins. She identifies pictures of her parents. She runs into the arms of her father as soon as he walks in . The Parents are happy about the changes that have happened through Drama Intervention.

A young man of 18 years from Coimbatore who attended our sessions has identified his passion for Photography and Modeling. He is now bent on Modeling as a career. Workshop with him on ***Emotional Intelligence and Body sculpting*** have improved his attitude to peers, parents and his self has undergone changes.

These are a few examples of the recent times and Velvi has been working in the field of Drama for Autism since 2003 and has changed the lives of many children and adults in ASD. It gave pointed directions to the Children and specifically altered the perspective of parents towards Autism. Autism may become awesome condition by consistent work on the challenges and strengths of Children.

Most parents start off with the challenges. Velvi corrected that with Strengths of the Children and how to build on the strengths and nurture the innate intelligence rather than focus on the problems posed by the parents. For example a boy of 6 years who has been hand flapping for years and the parents worried about this "unsocial behavior" today is learning Chenda (drums) and he is happy to play with the Chenda. Now there is no flapping. Just Drumming. A creative analysis of the child's challenges and directing the energy of the Child in a creative fashion will change the lives of persons in the Spectrum.

Let me briefly explain Drama for Autism and our intervention methodology.

Drama for Autism is conscious and intentional use of Drama and techniques of Drama to address specific issues of ASD: Eye Contact; communication issues; social skills; people skills; employability; adolescent sexuality.It can be offered individually or in groups.

The British Association of Dramatherapists defines it as ***"Dramatherapy is a form of psychological therapy in which all of the performance arts are utilised within the therapeutic relationship."***

Drama Therapy engages the entire self: physical, mental and emotional aspects. It evokes creative imagination which integrates past and present as well as inner and outer reality. The embodied action of drama therapy provides opportunities to build social, emotional, and behavioral coping skills. The therapy gives equal validity to body and mind within the dramatic context; stories, myths, ritual, playtexts, project narrative, role plays, voice work, puppetry, masks and improvisation are examples of the range of artistic interventions employed. These will enable the person to explore difficult and painful life experiences through an indirect approach.

When we watch a play or film, read a book or hear a story we often find that the predicaments or reactions of the fictional characters, who may be very distant from us in time, class, culture or life style provoke a strong emotional reaction. Because emotions in real life can become overwhelming, we sometimes block them out or retreat from them. In a fictional reality, we can allow ourselves to feel things without having to deny their presence because we know fiction protects us but also allows us to be involved. The fiction can filter powerful feelings through to us but they do not engulf us, allowing us to acknowledge them and unlock some of the feelings that may be difficult to cope with. This is true of all of sorts of unwelcome thoughts and feelings, from envy to real psychological distress.

In our everyday speech we often use vivid sayings to describe how we feel. We might describe feelings of despair as like being in a dark tunnel without any light at the end, or say 'I can't see the wood for the trees' when we cannot focus on a particular issue. These are like a dramatic expression of how we feel and could be a starting point for Dramatherapy.

Drama for Autism treats each person as unique and understands that each person has Intelligence (Following Howard Gardner's Theory of Mind and Multiple Intelligences). Most importantly Drama for Autism helps a person to connect with his/her Body, connect with space and connect with people (audience).

In the first week of April "unsocial behavior" today is characters, who may be

PT Guest Column

Understanding one's Body is fundamental to playing roles and acting and this is equally important with children and adults in the spectrum. Space orientation and audience relatedness are key issues in drama as well as training for persons in the spectrum. No intervention offers this kind of training as far as my knowledge goes.

Drama therapy programs can play a crucial role in the development of an autistic young adult's self esteem and social skills. They can provide a fun yet challenging environment in which all kinds of relevant expression is allowed and encouraged.

It is built on four principles:
1. Inclusion 2. Free Expression 3. Non judgement 4. Interaction

Dramatherapy includes ***singing, rhythm and music*** which provide structure and an enjoyable creative outlet. It allows the child to interact with the world physically and therefore explore how they fit in with their environment.

Play is a universal language for all children and forms another important element in Dramatherapy, being essential to a child's development and used in different ways throughout a child's and adult's life.

Dramatherapy sessions are highly structured which is very supportive for a child with ASD, yet at the same time they are child-led. Going at the child's own pace, interacting in the moment, and being led by the child's preferences offers them a sense of empowerment and a time and space that is just for them. Dramatherapy is often a sensory experience and uses elements such as touch, sound and colours to engage the senses.

A session or workshop specifically addresses one of the issues in the presence of the parent with the

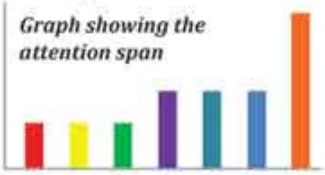
regularly and report periodically on the improvement or changes in the child for instance the issue of Eye Contact. More than 500 children have benefitted with the use of Theatre mask.

Face mask an off shoot of theatre mask has resulted in significant changes in eye contact and Bonding between the child and the parent. I distinctly remember two instances; A boy of 3 years working with his Mom doing Face Mask suddenly stopped: *Mom, where is your Bindi?* Mother started crying: *"I have never seen him looking at my face in all these three years and now he looks at me and my face."* The case of the Mother in Indiana is more touching when her 12 year old son told her during the Face mask workshop: *Mom you need a haircut.* First time her son making a comment about her face and hair. Face mask improves eye contact and improves attention span. Increases concentration and builds on Emotional bonding.

Social skills workshops involve: Meeting with people, going places, managing a Bully Befriending people, telling "white Lies" and making social conversations, understanding cues from Body language. It has also taken steps to conduct workshops on

Velvi conducts an annual art for Autism Festival in Januray-february. We have travelled to Chennai, Mumbai, Hyderabad, and Bangalore to run the festival where experts in Music /Art / Kinesiology / theatre work with participants in a Residential set up fostering friendship, developing skills and finally creating a performance. Our last performance was called "Under The Neem Tree." We also had the team from Mircale project working with us in 2011 and created a performance Home alone (but not alone). How the attention span improves is shown in a graph by one of our online course students. In 7 days of face mask a child improves attention span in a remarkable way.

Graph showing the attention span



Our social skills workshop focus on Body Posture, Gestures and words (in this order) so that even non-verbal's learn social skills. At the end of one workshop a young participant rushed to me: *Ram, You look*

To sum up, Drama Therapy can be an effective alternative treatment for children with Autism. It can provide a safe play space where a child with autism can learn how to play cooperatively with another individual and in turn learn how to develop important social interaction skills as well as conversational skills. Children can learn how to express their emotions and feelings through play and become more comfortable with the dramatic form, helping them develop a new form of self-expression and self-concept that allows them to express themselves freely and without judgment.

About velvi.org:

VelvLorg is a registered thespian organization entrusted to promote the global development of Autism Spectrum awareness and social competency skills for children and adults.

Velvi Art for Autism Festival Jan'14
Venue: PILLAR Madurai
Dates: 16-19 Jan'2014 for professionals & 17-19 Jan'2014 for Parents
What happens at the Festival:
Velvi Art for Autism Festival is meeting ground for professionals and every year we exchange new ideas and share with you our research in various art related therapies. We offer workshops & presentations and also let you observe our work with children/teens and adults. Festival 2014 brings in new therapists and new ideas and this year we are introducing ***Re Attach Therapy*** by *Paula Batholomeuz* from Netherlands and ***Comedy and clowning workshop***s by *Naree Shields* from Australia. Besides these two additions we will also have *Ms. Shaloo Sharma*, Head of Palhavanjali, Gurgoun, a centre for special needs, who will facilitate ***Arts Therapy.*** *Ms. Zill Batadkar* of Mumbai Light House will facilitate ***Movement Therapy.*** *Ms. Kavita Kumar* of New Delhi will facilitate ***Music Therapy.*** Her daughter *Benzy* is a special attraction at the festival. She will perform her musical compositions. *Ms. Indu Venugopal* a grooming and Image building specialist will run workshops for teens and adults and Professionals. *Dr. Parasuram Ramamoorthi*, Chair of Velvi, will present ***workshops on Drama for Autism*** at the Festival and direct a performance with the participants. Accommodation will be provided on a twin sharing basis. Madurai is well connected by air/train. ***Last date for registration:25 Dec'2013.***

In the first week of April "unsocial behavior" today is characters, who may be

15 Word Maze on Autism

Search as many words as you can related to Autism from the word maze below. They can be in any order or any direction. (Horizontal, vertical, from left to right, right to left, top to bottom, bottom to top). Please note that only internationlly recognised abbreviations / short forms should be included for e.g PNF, NDT etc.)

D	T	T	N	E	R	A	P	O	S	T	U	R	A	L	S	R	A
M	O	V	E	M	E	N	T	M	C	I	T	S	I	T	U	A	M
L	B	I	C	O	E	X	E	R	C	I	S	E	I	B	I	L	A
L	H	S	R	T	E	P	R	T	S	E	N	S	O	R	Y	U	R
E	H	U	O	O	H	O	P	E	L	E	C	N	A	L	A	B	D
C	C	A	F	R	A	N	T	I	P	S	Y	C	H	O	T	I	C
M	C	L	N	E	T	U	L	G	S	O	C	I	A	L	M	T	A
E	A	Q	I	M	I	T	A	T	I	O	N	H	A	D	O	S	R
T	E	R	E	P	E	T	I	T	I	V	E	N	F	I	M	E	S
S	T	E	R	E	O	T	Y	P	I	C	A	L	O	O	F	V	H

You can e-mail the answers (only key) of this word maze along with your name, city, designation & a profile picture on our email id: ***contact@physiotimes.com*** before 15th January' 2014 & the participant with maximum correct responses will be declared as the winner. The winner's details will be published in our forthcoming issue with photograph & he/she will be entitled to win the Special Prize.

Special Prize for the Winner

Parent & Teacher Guide Book for Autism

Author: Dr. Alok Sharma

Published by : NeuroGen Brain & Spine Institute, Mumbai

RESULT OF SHOULDER DISORDERS WORD MAZE#14

Congratulations !!!

The Winner is

Nupur Maheshwari

New Delhi

ANSWER KEY FOR SHOULDER DISORDER WORD MAZE # 14

DELTOID
FLEXION
GLENOHUMERAL
HUMERUS
INFRASPINATUS
INSTABILITY
JOINT
LABRUM
MCKENZIE
MOBILIZATION
PECTORALIS MAJOR
ROM
ROTATOR CUFF
ROWE TEST

We thank all the readers who participated in the word maze#14

Radhika Patil
Sunil Soni
Abhinav Sathe
Prachi Khandekar
Deepika Rudani
Keyur Gandhi
Harpreet S Sachdev
Kevin Agrawal
Divya Deepika
Disha Solanki
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Swati Nihil Khagram
Bindu Rani
J.K.Kerona
Samiksha Mourya
J. Wincy Rubarani
Harsha Jain
Sonal Rana

You key in the word "Autism" in google and you get nearly 18 million sites as your search result. Just to make your work easier, we bring to you selected sites on autism relevant to you for further reading.

www.autismconnect.in

This website aims at connecting parents and care-takers to all the resources available for autism such as special schools, rehabilitation centers, conventional therapies, new advances, etc.

www.stemcellforautism.com

This website provides information on a new form of treatment called stem cell therapy. It highlights the efficacy of the use of stem cells in the treatment of autism.

www.autism-india.org
Provides support and services to persons with autism and their families & database of autism related organizations worldwide.

www.autismsocietyofindia.org
Advocates legal, medical, educational rights and protection of individuals with autism spectrum disorder.

www.autismspeaks.org
Autism Speaks is dedicated to funding research into the causes, prevention, treatments and a cure for autism.

www.animalangelsfoundation.com
Gives information of animal therapy in India for children with Autism.

www.autismresourcecenter.in
Brings information and tries to lessen the confusion that parents have about what exactly to do for their child.

www. autism-society.org
Focuses on increasing public awareness about day-to-day issues faced by people on the spectrum for individuals across the lifespan, and providing the latest information.

www.autismnj.org
Autism New Jersey is a nonprofit agency committed to ensuring safe and fulfilling lives for individuals with autism, their families, and the professionals who support them.

www.autism.com
The Autistic Global Initiative (AGI) is a program of ARI with a mission to foster the development of adults on the autism spectrum and those who work with and for them.

www.autismweb.com
A community of parents interested in autism, Pervasive developmental disorder (PDD) and Asperger's syndrome.

www.ahany.org
Provides information to increase awareness and knowledge of higher functioning autism and provide parents and professionals with a useful forum.

www.autismhwy.com
This is a forum for parents and professionals.

www.autismbeacon.com
Founded by a parent of a child with autism is a community for parents, caregivers, service providers, seasoned professionals, advocates and family members.

www.autism.healingthresholds.com – A free website that provides comprehensive therapy fact sheets, daily updates of research and news, and a global directory of autism therapists.

www.autismnow.org
Provides a dynamic and interactive, highly visible and effective central point of quality resources and information for individuals with autism spectrum disorders and their families.

www.autismawareness.com
This site is dedicated to education programs that promote understanding of ASD throughout the nation, and supporting and advocating for the needs of individuals on the spectrum, and their families.

www.autism.org.uk
The national autistic society provides information, support and pioneering services, and campaign for a better world for people with autism.

www.autism.net
Geneva centre for autism offers a wide range of clinical services which are determined individually for each person with autism spectrum disorder.

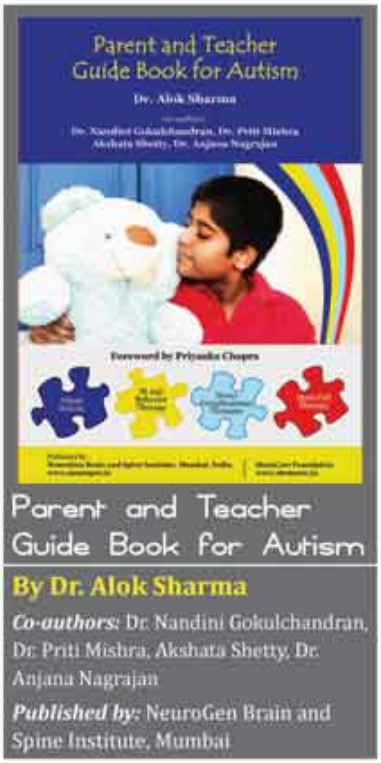
www.autismsocietycanada.ca
ASC puts special focus on providing information, referral and resources for parents and other family members who are seeking support for children with autism.

www.nationalautismassociation.org – NAA provides autism research funding, ongoing advocacy, support and education.

www.autismasperger.net
Serves to build greater awareness of the autism spectrum and in particular, asperger syndrome.

"I myself am opaque, for some reason. Their eyes cannot see me. Yes, that's it: The world is autistic with respect to me." — Anne Nesbet, The Cabinet of Earths

Children on the autism spectrum quite literally live in a world of their own. "Normal" concepts such as language, eye contact, social interaction etiquette, etc are alien to them. They have a different realm of understanding, comprehension & communication. It is necessary for us in the "normal" world to realize that even though these children do not behave in the way we do, they are not lacking in any way and they should not be treated in slight ways. It is for us to accept that they are merely "different" from who we are.



It is necessary for us to integrate these children into the mainstream, to make them an accepted part of our society and most important to maintain their dignity while trying to do so. This enormous task must be carried out by the families, teachers, therapists, etc. It is imperative for these care-givers to enter and understand the "autistic" mind, and then mould the teaching and therapy strategies accordingly.

The Parent and Teacher Guidebook for Autism is a step in this direction. It is a book written by doctors and therapists, in simple language, addressing all aspects related to autism. It begins with a foreword from Ms. Priyanka Chopra, describing her experience during her role as "Jhilmil" the autistic girl in the movie Barfi.

It has 6 extensive sections, covering topics such as information about autism, characteristic features, assessments & investigations that should be known to parents, management techniques, newer treatment options and holistic care.

The book primarily focuses on methods of management which range from conventional options such as medical management, occupational therapy, behavior therapy, speech therapy, art therapy, diet & nutrition, yoga, etc. to newer treatment options such as stem cell therapy, hyperbaric oxygen therapy, vitamin B12 management.

It further throws light on subjects such as assistive technology, type of schooling, modifications at home, vocational guidance, laws & regulations, etc. for children with autism.

The book is dedicated to the parents of these children and strives to serve as an exhaustive guide in order to help them to handle autism in a more efficient and effective manner.

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Available in 5 sizes

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Physio Activity Roll

Gymnic Classic Physio Ball
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Therasensory Ball
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Senso'o'roll
50 x 80 cm

Hop

Muti Activ Stones

Sport Ball
(To & Fro Ball)

Crawling Tunnel

Soft Gym

AUTISM CHILD DEVELOPMENT CENTRE
Mumbai, India.

Autism Child Development Centre (ACDC), is a neurorehabilitation centre for children affected with Autism and other neurodevelopmental disorders. We provide comprehensive holistic medical and rehabilitative treatments under one roof in a comfortable, leisurely and child- friendly environment.

- Applied Behaviour Analysis (ABA)
- Occupational Therapy
- Psychological Intervention
- Speech Therapy
- Physiotherapy
- Diet & Nutrition
- Art Based Therapy
- Music Therapy
- Play Therapy
- Aquatic Therapy
- Pharmaco-therapy
- Stem Cell Therapy

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NeuroGen Brain and Spine Institute

Mumbai, India

offers

Stem Cell Therapy & Holistic Rehab.

for Autism

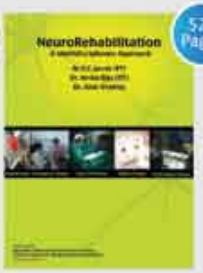
& Neurodevelopmental Disorders

(Cerebral Palsy, Mental Retardation, Brain Stroke, Muscular Dystrophy, Spinal Cord Injury Head Injury, Cerebellar Ataxia, Dementia, Motor Neuron Disease, Multiple Sclerosis and Neuropsychiatric Disorders)

FREE

Parent & Teacher Guide Book for Autism

Stem Cell Therapy in Neurological Disorders



NeuroRehabilitation - A Multidisciplinary Approach

Stemming Autism with Hope, Care and Stem Cell Therapy

To get a free copy of Books & Documentary CDs by NeuroGen on Autism, Stem Cell Therapy & Neuro Rehabilitation email us on *books@neurogen.in*

NeuroGen Brain and Spine Institute has been set up to help patients suffering from incurable neurological disorders get relief from their symptoms and physical disabilities by the use of stem cell therapy in a safe and effective way. Stem cells derived from the patients own body are used to start a repair process in the damaged areas of the brain and spine. This therapy is carried out in combination with an intensive neurorehabilitation program (physiotherapy, occupational therapy, psychological counselling, speech therapy, nutrition, etc)., which help to boost the activities of the stem cells in the body. Over 1400 patients suffering from incurable disorders of the brain and spine have been treated, 70-80% of whom have shown improvements. This treatment provides a holistic approach and has proven to be extremely effective, with no major side effects.

NeuroGen
Brain and Spine Institute
Centre for Stem Cell Therapy and Neurorehabilitation
ISO 9001:2008 Certified

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