Chapter-1 INTRODUCTION

1.0 Autism

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental disorder most collectively and commonly diagnosed as childhood developmental disorder that is caused by differences how the brain functions (Keita, Guy, Berthiaume, & Mottron, 2014). The onset of Autism appears between 18 to 36 months of early childhood and is a pervasive developmental disorder (Malhotra, Rajender, Bhatia, & Singh, 2010). Way back in 1943, a study found that a group of 11 children whose behavior was totally different from typically developing children of same age group (Kanner, 1943). He published a twenty-page article about this in a journal called "Nervous Child" which doesn't exist today. This time around in 1944 a paper published by Austrian psychiatrist who did pioneering work by developing the concept of Autism (Frith, 1944).

The severity of symptoms ranges from mild to severe with core symptom being social interaction and repetitive behavior (Asokan, Meera, & Shivashankar, 2016). The ASD children are deficient of social communication and interaction and categorized as verbal and non-verbal. Verbal children utter some words irrelevant to situation, inappropriate and repetitive language whereas non-verbal may communicate by way of looking at caller silently or turning towards sound or body language (Samy, Osman, Selim, & Mohamed, 2012). ASD children fail to initiate peer relationship, communication and sharing joyous moments. Parents, caregivers, special educators or teachers should be aware of childhood developmental milestones of a child from birth to five years of age. This information helps in observation of children in this age find deficiencies to take corrective actions of diagnosing any abnormality of childhood

development. Autism is a pervasive developmental disorder which remains throughout the lifespan of an individual and individuals affected by this disorder will have a normal lifespan like others (Malhotra, Rajender, Bhatia, & Singh, 2010). It is characterized by severe impairment in social communication, lack of attention span, rigidness, restrictive and repetitive behavior, adhering to sameness etc. Communication and behavioral oddities of autism are often considered to be difficult to treat and challenging. Self-control problems commonly manifest as temper outburst and repetitive/rigid/impulsive behaviors in children with ASD (Chan, Sze, Siu, Lau, & Cheung, 2013). Due to exact cause for Autism symptoms yet to be established, no effective treatment available. Behavior intervention was the gold standard to treat ASD children till recently whose success limited to a certain extent only. Early diagnosis and behavior intervention play a vital role in overall development of ASD children. Now it is established that ASD children suffer from both physiological like sleep disorder and gastrointestinal problems and psychological problems which manifest in behavioral problems (Narasingharao, Pradhan, & Navaneetham, 2016). Due non-availability of proper treatment or interventions parents find alternative therapies available locally based on ancient treatment methods or search the internet to find alternative therapies which are cost effective. *Yoga* has proven to be effective in treating psychological and mental health related problems(Bussing, Michalsen, Khalsa, Telles, & Sherman, 2012; Christensen, Baio, & Braun, 2016)**.** Autism is etiologically and clinically heterogeneous group of Pervasive Developmental Disorder (Balasubramaniam, Telles, & Doraiswamy, 2013; Keshavan, Rao, & Rao, 2013a; Miles, 2011). By not establishing contact with outside world ASD children isolate themselves making Center of revolving the world and feel safe in that. In 1988 combined vaccine of measles, mumps and rubella were introduced in the UK as part of Childhood Immunization schedule as these

diseases were widespread and morbidity rate was high. Though this came under control at the same time rate of autism seen rising. It was suspected then that Measles, Mumps, and Rubella (MMR) vaccine may cause this rise which was not established, but some parents raising concerns about this (B. Taylor, Miller, Lingam, & Andrews, 1998). Though the exact cause not established it is suspected that can be because of genetic and environmental factors. There seems to be some disagreement between medical, researchers and scientists and parents about the cause of this disorder (Labib, Hassan, Mostafa, & Ahmed, 2012). The increase in incidence and prevalence over the span few decades rule the only genetic reason for this disorder. ASD children are unable to create contact emotionally and biological with others and lack of social reciprocity is the central part of the diagnosis. Recurrence of the developmental disorder among siblings raise to concern about possible genetically link for this disorder (Chaste & Leboyer, 2012). It is complex type of disorder exact causes yet be known, but suspected causes may be genetic, environmental, vaccination, family history of having siblings, older age of mothers, single gene like fragile X syndrome, immune-associated conditions, pregnancy-related complications (use of infertility treatment, low birth weight, maternal infections, obstetric complications, obesity, maternal diabetes, environmental pollutants, use of medication during pregnancy etc. The manifestation of autism happens around 18 to 30 months of early childhood. It may happen in one or two ways. In one type some children show abnormalities in social communication of their first year of developmental age. Parents can notice this by delayed speech among their children. In other type children may appear normal in the first and second year but later year children may lose skills they had developed previously with the onset of some autistic symptoms. Regression effect studied previously involving small sample size. Its effects are on as low as 20% to 50%

(Ozonoff, Heung, Byrd, Hansen, & Picciotto, 2008). ASD children develop with complex behavior due to the immature brain which will be a static disorder.

Epidemiologic studies show the causative factors can be the presence of toxins in the environment, perinatal insults or prenatal infections which cause rubella and cytomegalovirus. Epilepsy is the other medical condition associated with autism due to unknown causes (Vajawat & Deepika, 2012). Detection of onset of autism children is a difficult task and challenging for children below 30 months of age have delayed languages the acquisition will have the same pattern of sounding language like ASD. Repeating the last word of the sentence by typically growing children with delayed speech will lead to confusion that of ASD children whose core symptom also similar one ie. mirroring the ASD symptoms of echolalia (L, Pedraza, & Carter, 2011).

Families of ASD children generally will have more financial burden than their counterpart of typically growing children as the cost of treatment and expenses toward the special education of these children will be very high. To take care of ASD children exclusively one person always should be there due to the vulnerability of the child getting injured or do some grievous things due to their behavior problems. In this situation, one of the earning members of the family generally mothers of the child may have to discontinue the job which again cost family financially. In the United States as per the 2011 estimation for ASD children starting from child's birth to 17 years of age around $11.5 billion to $60.9 billion US dollars was spent for direct and indirect expenses like medical care and special education etc. It is a high cost for individual family and also the community as a whole. The distinct trajectories of children with

autism spectrum disorders have not been extensively studied, particularly regarding clinical manifestations beyond the neurobehavioral criteria from the Diagnostic and Statistical Manual of Mental Disorder (Doshi-Velez, 2014). The International Classification of Diseases, 10th edition (ICD-10) (WHO, 1993), including autistic disorder, Asperser's syndrome, pervasive developmental disorder-not otherwise specified (PDD-NOS), Rett's syndrome, and childhood disintegrative disorder as pervasive developmental disorders (Levy & Hyman, 2008).

1.2. Prevalence of ASD

1.2.1. Prevalence of ASD Children around the World

The prevalence of ASD children increased over a period of time all over the world. The increase was considered high because of improved diagnostic methods at an early age of childhood. As per the latest estimates in the United States, it is 1 in 68 as according to report published by Centre for Disease Control and Prevention (Christensen et al., 2016). This forms 1 to 1.5 percent of 8-year-old children in the United States (Doshi-Velez, Yaorong, & Kohane, 2014). Between 2010 and 2012 there was no significant change in the autism population. Previously, it was 1 in 150 in the year 2000 and 1 in 88 in 2012 (CDC, 2014). This was further increased to a present rate of 1 in 68 which show 119.5 percent increase during this period. The magnitude of the increase was greatest for the boys than the girls considering the adolescent's age between 14-17 (1 in 42 boys and 1 in 189 girls that are five times more boys than the girls). So, the Autism is the fastest developing disorder among all other pervasive developmental disabilities not otherwise specified (PDD-NOS). Prevalence in some of the countries like Quito, Ecuador, is 0.11% among pupils other than the children and adolescents which it requires a thorough diagnosis to arrive at the actual prevalence of

ASD children (Dekkers, Groot, MoS Iuera, & Zuniga, 2015). In California, the prevalence of autism rose through 1990 to 2016 considering at an age of 5 years. In the year 2003, the prevalence rate was reported as 34 per 10,000 of the population considering the age between 3 to 10 years. This was possible because of increase in awareness among parents and improved diagnostic methods (Fombonne, 2003). Further, it went up from 6.2 per 10,000 to 42.5 in 2001 of the total population (Hertz-Picciotto & Delwiche, 2009). If data of 2008 is considered and compared with the period from 2002 to 2006 the increase of prevalence rate shows 23%. Considering age of 8 years old children it was 1 per 150(0.66%) in 2002, 1 per 125(0.80%) in 2004, 1 per 110(0.90%) in 2006 and 1 per 88(1.14%) in 2008 which shows rapid increase in ASD prevalence (CDC, 2014a). Another CDC report indicated that for the surveillance year of 2006 the prevalence rate of ASD population was 9.0 per 1000 considering the age of children as 8 years. The survey was conducted in 11 Autism and Developmental Disabilities Monitoring (ADDM) states and arrived at this figure (Rutledge, Boyd, & Starr, 2009). Many countries in Europe also seen an increased rate of prevalence in Autism population. In the UK the rate is 1% of the population or which 94 per 10, 000 as per SEN register and 99 per 10,000 according to diagnosis survey (Baron-Cohen, Scott, Allison, & Williams, 2009; Brett, Warnell, Mcconachie, & Parr, 2016). Overall 1% of the population suffering from autism is substantial and this section of the population also suffering from many social and economic issues apart from physical health (Elsabbagh, 2012).

1.2.2 Prevalence in India

In India autism was not considered as a major disability until recently due to lack awareness among parents, the general public and medical fraternity, hence the prevalence of autism in

India is not known precisely. In 1944 a Viennese pediatrician working in Darjeeling mentioned about autism in India and that was the year he wrote an article about this issue. But according to estimation about 1% of the population in India suffering from autism spectrum disorder (Barua & Daley, 2002). This estimation may be applicable to the urban population considering the lack of awareness in the rural area. In the rural area of India, all such problems are being considered as just another type of mental retardation even now but, later in 1959 and 1960, it was elaborated more about this disorder. With accessibility to internet and western literature and migration of medical fraternity from India to western countries and vice-versa people got knowledge about this disorder. Even the Government of India was not considered it as a severe medical condition but with persistent efforts from NGOs like Academy for Severe Handicaps and Autism (ASHA) and others, recently it was included in the list of severe mental disorder. However, it is now estimated that about 2.3 million people in India suffering from autism.

1.3 Basis for this study

1.3.1 Introduction

Recent researches show that other than behavior problems, ASD children also suffer from physiological problems like sleep disorders and gastrointestinal problems, which may aggravate the severity of the daytime behavior. Autism is multifactorial etiology which is termed as a static encephalopathy disorder which has no specific cure, except behavioral intervention.

1.3.2 Sleep disorder

Sleep is one of the basic needs of human beings like food that we take to sustain. Both food and sleep are physiological needs of the human body. Studies on sleep problems of ASD children are very scarce. Initiating and maintaining sleep for the longer period among ASD children is very difficult (Allik, Larsson, & Smedje, 2006). If sleep is disrupted then, it affects academic, behavior and other activities during daytime. Sleep disorder is a common concern for individuals with Autism Spectrum Disorder children. Evidence suggests that there seem to be significant sleep problems with ASD children (Cohen, Simonne, 2014). The rate of disturbed sleep is very high among ASD (Beth A. Malow & Susan G. McGrew, Lily Wang, Lynnette M. Henderson, 2006). The sleep problems exacerbate symptoms of autism (Schreck, Mulick, & Smith, 2004). Due to disturbed sleep or lack of sleep at night, most of the ASD children behave aggressively during the daytime which makes it difficult for the caretakers in general and mothers in particular to manage them. Sleep disorders among ASD children can also result in disturbed sleep among family members. Identification and proper treatment of sleep disorders of both the child and the adult is an important factor in treating the ASD children. This will help in better management of daytime Behavior problems. The ASD children's sleep disorders include refusing to go to bed, insomnia, sleepiness during daytime, sleep apnoea etc. (Klukowski, Wasilewska, & Lebensztejn, 2015). Difficulties pertaining to sleep and patterns of disrupted sleep can have a negative effect on academic, emotional, behavioral, physical and social functioning. If detected early, the sleep disorders of ASD children and properly utilized strategies by qualified professionals may prove to be helpful to these children(Brown et al., 2012). Due to indifferent sleeping patterns of the ASD children, the routine of the entire family gets disturbed causing them to undergo a lot of stress particularly for the immediate caretaker who in most cases is the mother.

1.3.3 Gastrointestinal problems

The other medical condition which requires immediate attention is gastrointestinal problems(Erik Mouridsen Svend, Torben Isager, 2012). Gastrointestinal problems among subsets of autism individuals lead to chronic constipation, diarrhea, abdominal pain, bloody stools, vomiting and gaseousness (Hsiao, 2014). Gastrointestinal symptoms associated with inflammation in intestinal tract, irritation bowel syndrome, bloating and other digestion related problems. Some ASD children always insist to have a particular type of food due to which imbalances in the diet may happen (Gorrindo, Williams, Lee, & Walker, 2012). GI problems and associated symptoms are very common among autistic children but these conditions are not completely understood (Buie, Campbell, Hyman, & Jirapinyo, 2010). Most of the children don't chew the food properly and swallow instead and this may lead to digestion problems. Some children may not eat fruits, vegetables or some food which should be a part of their daily balanced diet. Gastrointestinal problems may be associated with compositional changes in intestinal bacteria(Brent L. Williams, Mady Hornig, Tanmay Parekh, 2012). All these problems may lead to imbalanced food and nutrition supply to the body. In pediatric settings, parents often raise concerns about possible gastrointestinal (GI) symptoms in autism spectrum disorder, yet the specificity of these concerns are not well studied. Gastrointestinal dysfunction (GID) in ASD children is not properly understood(Barbara O. McElhanon, MD, McCracken, PhD, a Saul Karpen, MD, PhD, & Sharp, PhD, 2014). Different factors associated with GID could be atypical eating habits of ASD children when compared to normal children. All these days it was considered as the parents' perception of GID in ASD children(Phillip Gorrindo, BSA, Kent C. Williams, MDB, Evon B. Lee, PhDB, C, Lynn S. Walker & Susan G. McGrew, MDB, and Pat Levitt, 2013). Due to communication problems associated with the ASD children, it is very difficult to understand this

issue. Experts in this area need to understand the whole issue related to the GID of ASD children instead of relying on the opinion of parents as parents themselves may not be experts in determining the GID problems of their children. A subgroup of ASD children suffers from symptoms like belching, constipation, bloating, abdominal pain reflux, vomiting, flatulence etc. Some of the ASD children also suffer from urine & fecal incontinence problems (Hanney, Jostad, LeBlanc, Carr, & Castile, 2013).

1.3.4 Behavior problems

More importance is being given to Behavior interventions for ASD children and it is the only intervention available right now in conventional methods. ASD children disconnect themselves from the external world and involve in self-stimulatory behaviors, self-injuring like biting, head banging, unusual talk or peculiar sounds, running around without purpose, lack of sitting tolerance, lack attention, learning disability etc. An individual with autism spectrum disorder requires Behavior interventions throughout the life since it is a pervasive developmental disorder. Behavior intervention is needed in multiple areas such as social Behavior, social communication, and interaction, psychosocial Behavior, motor movement, sensory integration, intellectual disability, cognitive difficulties, life skills problems, to control self-stimulation behaviors, defiance behaviors, rigidity, repeat restricted Behavior problems etc. ASD children also suffer from depression and anxiety and require psychiatric treatment. In case of an individual with autism and is adult or older age hospitalization may require for psychiatric treatments (Gabriels et al., 2012). Psychiatric comorbidities have been reported to be 72% among infantile childhood of autism children(Lord et al., 2005). To some extent Behavior interventions are found to be successful which helps some children to do better in academic and social communication, etc. ASD children are unique and they differ from each other in patterns of Behavior. Early diagnosis

and intervention plays a major role in improving the health and Behavior of ASD children. Other than high-functioning autistic children with good communication skills, most of the children are associated deficit expressive and receptive language skills.

1.3.5 *Yoga* as therapy

Availability and role of Pharmacological intervention are limited to ASD children. The integrated approach of *Yoga* helps children to improve imitation skills, social communication and also helps in improving the overall quality of life (Shantha Radhakrishna, Raghuram Nagarathna, 2010). Attempts have been made to identify safe and effective complementary and alternative therapy for the families of ASD children (Akins, Angkustsiri, & Hansen, 2016). *Yoga* acts as sensory integration which helps children to overcome excess stimuli in their life (Studnitzer, Allen, 2014). Since the children require individual attention even for behavior intervention, the cost of the intervention is too high. ASD children suffer from attention deficit and *Yoga* helps in overcoming this problem (Hariprasad, Arasappa, Varambally, Srinath, & Gangadhar, n.d.). Most of the parents cannot afford intervention, particularly in India due to the poor financial background of the majority of the families (Juneja et al., 2012). Such parents go in search of low-cost alternative medicine and therapies. As the prevalence of ASD children increases so does the need for alternative therapies for effective intervention to reduce the intensity of symptoms. Integrated movement therapy involving *Yoga* bring changes in speech, language pathology and overall mental health (Kenny, 2002). There has been increased interest in developing an effective intervention for ASD children. *Yoga* has been found to bring positive effects on mental health of the ASD children (Keshavan, Rao, & Rao, 2013b). *Yoga* is an ancient science being practiced in India for thousands of years. The meaning of the word *Yoga* is oneness or to join two into one that is to unite body and mind (Studnitzer, Allen, 2014). *Yoga* also helps in improving sensory

integration, motor movements and increase in cognitive ability, social communication, and interaction etc. By practicing *Pavana Mukthasāna* set of asana (wind releasing exercises) gastrointestinal symptoms which leads to digestion related problems can be solved. Breathing practices and meditation helps in psychological related problems like concentration, increasing attention span and memory power. By practicing dynamic exercises and loosening exercises excessive energy can be controlled which helps in reducing hyper activeness of children. *Yoga* is a form of alternative therapy for those with the autism spectrum disorder. *Yoga* acts as a form of sensory integration therapy, which helps ASD children cope with the overload of stimuli in their day to day life. Caretakers particularly mothers are prone to excessive stress in managing ASD children. Keeping this in mind mothers also should be made part of any *Yoga* intervention for ASD children. Apart from assisting trainers in making a child perform *Yoga*, they can learn *Yoga* themselves, which can help them in reducing the stress level in dealing with autistic children.