Chapter – 7 DISCUSSIONS

7.0 Introduction

This study was a two-group pre and post control group design involving 64 children at the recruitment stage, but at the end of the study, three children from control group did not attend for data collection. It has been just controlled group who has assured the benefit of the *Yoga* intervention after school vacation. A total of 61 children remained in the post-intervention data collection after the three-month intervention. So the three children considered to be a dropout from the control group. The reason given by school authority that was monitoring the study was that parent was out of the station and may not return within a short period of time. This was the first study to check the efficacy of *Yoga* intervention for sleep problems, gastrointestinal problems and behavior problems together of ASD children. Since the etiology of ASD symptoms not yet established exactly and they are best known for behavior problems recent researches indicate that the behavior problems may be due to sleep problems and gastrointestinal problems.

ASD children express cannot express themselves of any physiological problems, but that may manifest in behavior problems. Parents have to observe their food habits, bowel movements, and sleep patterns and understand the problems of the children. In a similar way for data collection, only parents can give information about the children. According to the primary data collected, most of the children having improper food habits and bowel movements apart from lack of sufficient sleep. Pre-intervention data of both intervention and control group are similar. After three months of intervention, significant changes were seen in the *Yoga* group compared to control group. It was again the observation made by the parents themselves and scoring given which clearly shows

improvement in all areas of problems of *Yoga* group, whereas control group continued with similar problems. It was not planned to give intervention to control group immediately and collect data. It was the option given for them to attend intervention after school summer vacation. Within the group analysis of both groups using Wilcoxon Signed Rank test and Mann Whitney for between the groups was done for the pre-intervention data and found to be similar in both the group indicating the problems exists with children of both the group.

The children enjoyed *Yoga* intervention sessions along with their caretakers. The presence of school teachers during intervention helped in the successful completion of the intervention. This was a first scientific study involving *Yoga* intervention for a large group of ASD children. Previous studies were conducted targeting behavior problems with *Yoga* intervention. As recent studies showing physiological problems like sleep and GI problems, this study was planned to test the efficacy of *Yoga* intervention for three problematic areas of ASD children as follows with three-month *Yoga* intervention.

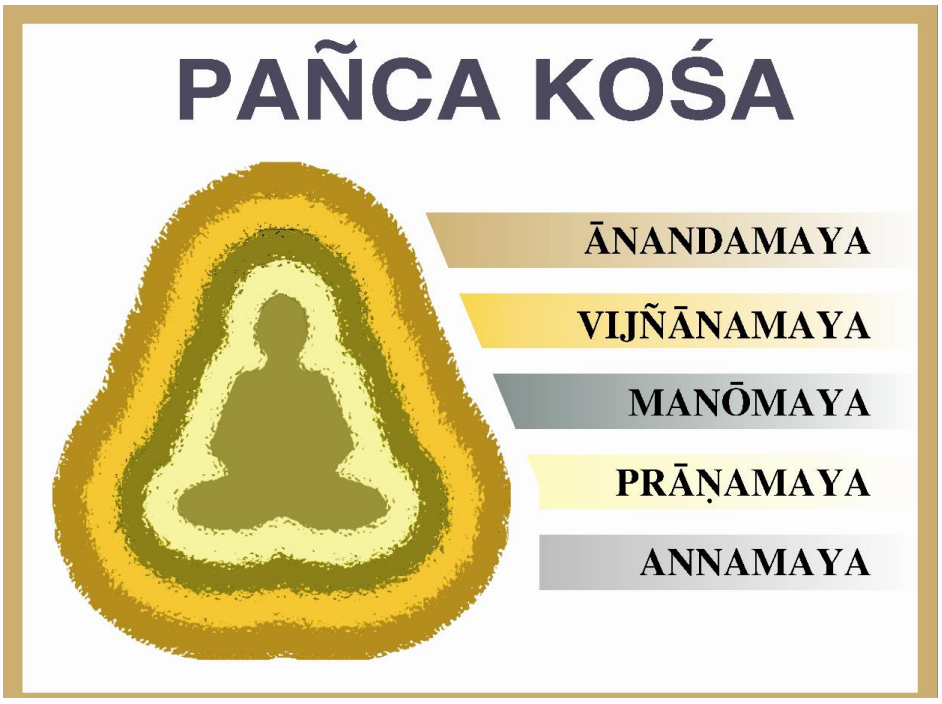
a. Sleep disorder
b. Gastrointestinal disorder (digestion problems and food habits) and
c. Behavior problems

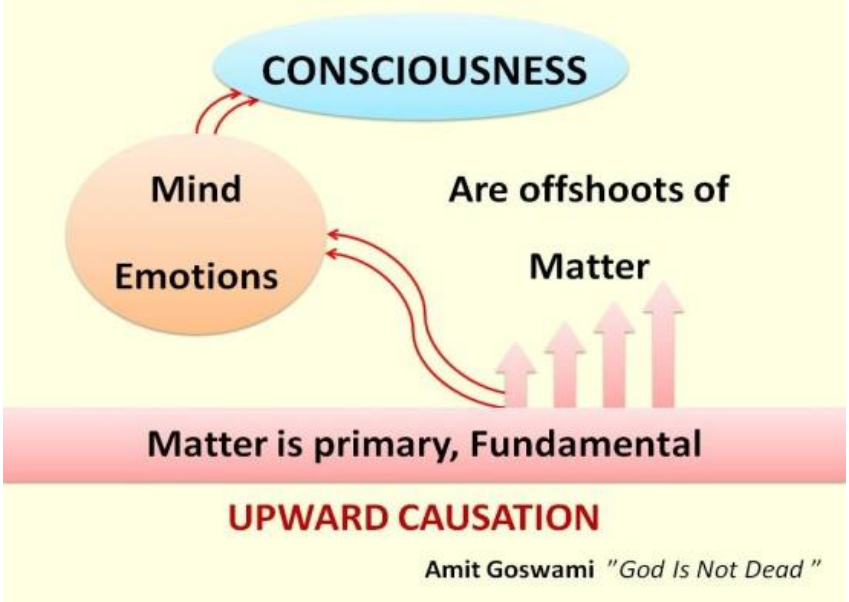
Post-intervention, comparing pre and post data significant results have been found in all the sixty-one item which are indicators of various problems of ASD children. The researcher is totally depending on caretakers of children as one of the core symptoms of ASD children was communication problems. The *Yoga* session was intensive started in the last week of January 2016 and finished in the last week of April 2016. Except 2-3 national holiday session was conducted all the days of the week

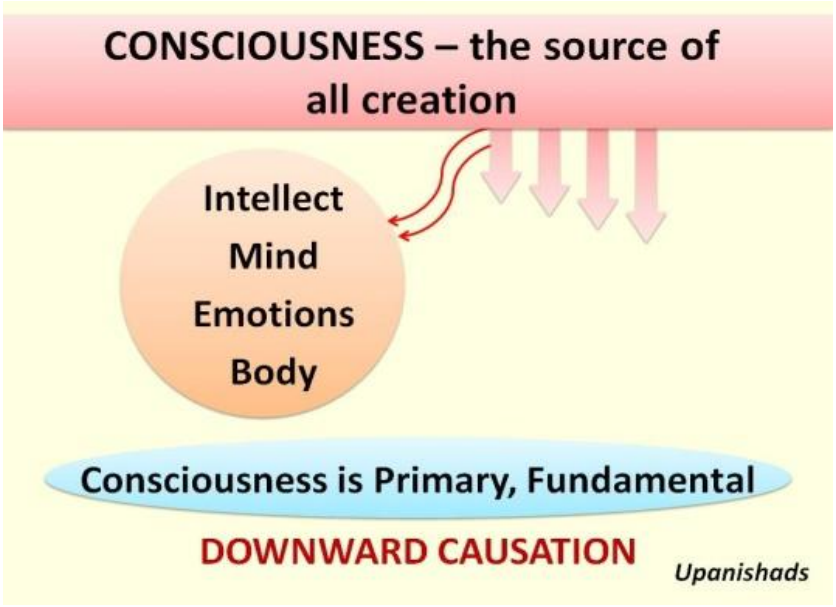
continuously as both parents and children showed enthusiasm in attending sessions.

7.1 Effect of *Yoga* Therapy Based on Concept of *Pancha Kosa*

According to *Yoga* concept, *Panca Kosa* is the basis for the formation and existence of the human body considering both physiological and psychological aspects. These five *Kosa* are subtle and casual bodies which are unseen layers encompass the gross physical body. Upanishadic explanation gives an elaborate picture of *Panca Kosa* or five bodies which we all possess.







The wisdom of ancient India and modern medical science always contradict about this concept. Consciousness is primary and ends matter according to Upanishad and it is an unchanging reality with fullness, infinite power, bliss, knowledge which brings out creation to show off as if it's innate power by

mere will. The five layers emerge from pure consciousness and are *Anandamaya Kosa, Vijnanamaya Kosa, Manomaya Kosa, Pranamaya Kosa* and *Annamaya Kosa* which forms creation, sustenance an and destruction. The human body is in the ever-changing process in the form of birth of creation and destruction of a billion cells every minute. All the five *Kosas* are interconnected and any change in one layer brings changes in other layers.

7.2 The three *Guna* Concept

Haman beings of made of three gunas which are of permutations and combination of three fundamental personalities of traits. The three *gunas* are *Tamasic*, *Rajasic* and *Sattvic*. *Tamas guna* is the grossest characteristic of which leads to inactivity, lethargy, drowsiness, sleepiness, slow learning and resistance to any action. *Rajasic* characteristic shows leadership or to shine, dynamic, brilliant, full of energy and vitality, workaholic and always in the forefront of the action. The person of *Rajo guna* has often become selfish and always behind amassing wealth, name, and fame which may get exposed to stress and strain in the process and may acquire modern day lifestyle diseases. Whereas the quality of *Sattvik* shows the reduced selfishness, love for others, full of divine virtues, magnanimity, compassion, service attitude and sharing with others, etc. Modern day lifestyle disorders like asthma, arthritis, cancer, diabetes, hypertension, mental disorders, psychological disorders which include even Autism are due to the presence of excessive *Rajasic* character. The *Rajasic* lifestyle leads to speed and greed of life and prone to get lifestyle disorders at an early age. These *gunas* lead to personality traits, *Gunas* show up as heredity tendencies which results in certain disorders like Autism in the next generation. There is a chance of born *Sattvic* person acquiring *Rajasic guna* due to exposer of modern day lifestyle. With adopting modified and proper lifestyle person of other *gunas* can acquire *Sattvic gunas* and regain his

health. The human being has a capacity and conscious to change them with willpower which is called *Yoga*.

7.3 Disorders based on *Gunas*

Due to hereditary factors which are influenced by *guna* some modern-day disorders appears in a new generation. Some of the mental and psychological disorders like cerebral palsy, mental retardation even Autism Spectrum Disorder as these all appear at birth. These disorders may be due to the distorted *gunas* of a human being. *Yoga's* deeper understanding of heredity which manifests deeper personality traits of *Tamas, Rajas* and *Sattva* at *Manomaya Kosha*. These will descend down to *Pranamaya Kosha Dosha* and show up as a disorder in the *Annamaya Kosha* called *Vyadis*. There is the continuous interaction of freedom in everybody about our *gunas* every moment which we should use to change our *gunas* effectively (Radhakrishna, 2010).

7.4 *Yoga* and Autism Spectrum Disorder

Since ASD children suffer from sleep, gastrointestinal problem and behavior problems it is directly related to impairment in *Annamaya Kosa* and *Manomaya Kosa*. Often Autism is called childhood Schizophrenia. Here mind instead of flowing down through *Pranamaya Kosa to Annamaya Kosa* get struck into whirlpool like obsessions. The mind is in the transition from full *Rajas* from *Tamas* at this stage.

Based on this concept this study was conceptualized and conducted an intervention to see the effect of *Yoga* on ASD children.

7.4.1 Sleep

Lack of sleep among ASD children exacerbate and may affect their daytime activities and abnormal behavior. Insufficient sleep may imbalance the state of mind. *Yoga* brings changes at both physiological and psychological by practicing *Yoga* postures calm down the mind and help in having good sleep. Some of the problems faced by ASD children are resist going to bed, disturbed sleep during the night, wake up between sleep, not having a long stretch of sleep, sleep latency and snoring etc. Lack of sleep may be due psychological reasons due to a disturbed mind.

This experiment was conducted to evaluate the difference in post-*Yoga* intervention in three problematic areas of ASD children. Sleep disorder, gastrointestinal disorder (food and digestion) and behavior problems. Most of the people suffer from chronic sleep disorders which remain unidentified. People suffering from mental related or psychiatric problems, neurological problems, and ASD children are the people; mostly suffer more due to sleep problems. For sleep-related problems, there were fifteen interview schedules in this section related to unstructured sleep problems of ASD children. As per the pre-data-collection, most of the children had this problem at different severity level. For ASD children the sleep problems exist at a higher level, which manifests in daytime behavior problems. All outcomes of the results of the post data analysis were shown in Tables 6.1a, 6.1.b and 6.1.1 to 6.1.15 which indicates a significant positive change for the items related to different problems of sleep. These

significant results are also shown in the form of the graph representing pre and post differences with graphs starting from 6.1.1 to 6.1.15. During the intervention, we were having interaction with caretakers and after fifteen days of *Yoga* intervention, they have reported a change in the pattern of sleep of children. After one month of intervention, there was a marked change in sleep problems of all the children. In one of the pilot study conducted to evaluate the effect of gentle *Yoga* for older women with osteoarthritis and insomnia a significant change shown in post-*Yoga* intervention. The *Yoga* intervention was weekly 75 minutes and 20-minute daily night *Yoga* practice showed improvement in insomnia scores (Diana & Vitiello, 2012). Disturbed sleep can appear in any person due to different reasons which can be psychological or physiological. Minimum sleep is required for any individual depending on the age of the person. Insufficient sleep manifests in behavior problems like irritability, drowsiness, indigestion, insomnia and many more physiological and psychological problems. A recent research indicates that behavior problems of ASD can be due to unstructured sleep pattern or insufficient sleep during the night. Not many *Yoga* interventions have been done to address the sleep problems of ASD children but *Yoga* has been used effectively to address sleep problems related to insomnia, age-related sleep problems, sleep problems due to psychiatric problems and sleep problems due to different types of physiological problems. In another study conducted to find the effect of cyclic meditation which is part of *Yoga* practice participants practiced cyclic meditation twice a day for 23 minutes each and sleep pattern was monitored during night sleep (Kumar, Telles, & Nagendra, 2010). The logic of co-relating these studies to ASD children is the problem of sleep problem and *Yoga* intervention for this specific category of people. Deprivation of sleep and its after effect will be same to any individual. Hence some of the studies showing a positive result of a *Yoga* intervention for sleep disorder however cause may be different. Post-intervention shows that children

started having a long stretch of sleep without wakefulness of waking up in between sleep. With having good sleep during night time sleeping during daytime avoided. Children started following sleep routine with this entire family having peaceful sleep. In the previous study done by Supritha M shows *Yoga* intervention for sleep to the healthy volunteer's positive outcome (Supritha & Kumari, 2016). By practicing *Yoga* entire body parts get stimulated and mind calm down this way it helps children to have good sleep. *Yoga* acts as physical exercises and excess energy used positively thus the hyper energy is controlled. The ASD children suffer from anxiety and depression due to which they are deprived of sleep. *Yoga* reduces these symptoms according to a study was done by S Arockia Lucas (Lucas, 2014). Some of the improvements post *Yoga* intervention related to sleep where most the of children stopped snoring, avoided breathing from the mouth, bed wetting and stopped giving medicine for sleep-related problems (Manjunath & Telles, 2005). Influence of *Yoga* on the physiology of human body so much that during the study after the one month of intervention most of the parents given feedback of their children having good sleep. In one of the previous by Malathi for improving sleep and stress with *Pranayama* and *Yoga Nidra* which we have included in this study (Vivek & Maharana, 2016).

This was a parental based study and parents were regularly practiced *Yoga* with children having good sleep parents and other family started having a good sleep. In one of the previous study done by Jonathan showed improved sleep pattern among older adult post *Yoga* intervention (Halpern, 2011). The previous study shows that integrated approach of *Yoga* therapy improves the quality of sleep among mothers of mentally challenged children so the feedback from parents in this study found positive results (Karpakam, 2013). In this study, post-intervention shows children

adopted to sleep routine which helped immediate caretaker and the entire family members mostly of older age. This was proved in the previous study also who conducted long-term integrated *Yoga* approach to check the quality of sleep among the Indian geriatric population. In this study, there was a *Sloka* chanting for nine minutes as part of the intervention as it will have a positive effect on agitated minds of ASD children, particularly *Mruthunjaya Mantra* which helps to calm down mind subsequently have a good sleep. This was proved in one of the previous study done by S. Panda to find the effect of *Mruthunjaya Mantra* on sleep-disturbed patients (Panda, 2016). A control group study with sixty patients was done with the chanting of *Mruthunjaya Mantra*. Pittsburgh Sleep Quality Index (PSLEEP ITEMS) scale was used to measure the quality of sleep post intervention and found significant result among people who recited *Mruthunjaya Mantra*. Post-intervention parent's opinion data analysis indicates that ASD children improved in all areas of sleep-related problems. Having sound sleep for a long stretch without break, not snoring during the sound sleep, avoided breathing from the mouth during sleep, avoided daytime sleep and following sleep routine like going to bed and getting up in the morning without much agitation. Improved sleep at night made a significant change in daytime behaviors among most of the children. With all these changes in children, these changes in children immediate caretaker, as well as entire family members, relied on stress. When compared these results with control group there were no any changes observed in sleep-related problems.

7.4.2 Gastrointestinal problems

This was the second problematic area of ASD children for which this *Yoga* intervention conducted. Researches indicating ASD children suffer from gastrointestinal problems apart from sleep problems.

Indigestion and wrong food habits can cause inflammation in intestinal tracts, bloating problems, gastritis, irritable bowel syndrome, diarrhea and other uncomfortable reactions in stomachs which can lead to disturbed sleep during the night can also lead behavior problems. There was no *Yoga* intervention, conducted to address this specific problem of ASD children. But there is *Yoga* intervention done for a cross-section of the people to test the effect of *Yoga* on different problems related to food habits and digestion problem. Most of the ASD children were obese due to overeating or eating food without chewing properly which leads to improper digestion. Some children insist on eating a particular type of food like only rice, chapatti, roti etc., which creates short nourishment or an imbalance of vital vitamins in the body. Frequent urination or going to the toilet and unable to control urine or fecal discharge are some problems faced by ASD children. Communication is the main problem among the ASD children; hence they are unable to express themselves about pain in stomach, irritation due to inflammation in the gastrointestinal tract, inflammatory bowel disease or any other kind of uncomfortable in the stomach. ASD children also have the irrational food habits like frequently eating, demanding more food during meals and not eating all types of food which lead to a shortage in supplement of nourishment to the body for proper growth according to the related aging. All these are covered under G I Item to be answered by parents about children pre and post-intervention. Gastrointestinal problems arise due improper lifestyle, hygiene and improper eating habits apart from a stress level of the individual person. A set of wind releasing postures added specifically in this *Yoga* module and certain *Yoga* postures stimulate a lower portion of the abdomen which helps in removing gastrointestinal related problems. Gastrointestinal problems can also be due to psychological reasons which manifest in physiological condition. By practicing the wind releasing postures these can be addressed effectively. Parents have observed changes in food habits and digestion related problems

after two weeks of practice. The first week was parents helped children physically and from 2nd week many children started practicing themselves along with their caretakers.

Leg raising, leg rotation, cycling, rocking and rolling are some of the postures most effective for digestion related problems. In one previous study conducted by Ann MinYeh involving mind-body intervention for inflammatory bowel disease significant result was found (Yeh, Wren, & Golianu, 2017). Post-intervention ASD children have shown significant result and based on observation and opinion of parents. As per the review, paper *Yoga* is a mind-body technique which has mood enhancing properties that removes physiological stress and inflammation. Post-intervention analysis children suffering from irritable bowel syndrome got solved the problem as per the observation of parents and post data indicator. In one previous study also proved that in randomized control group study with Iyengar *Yoga* protocol significant result has been found for irritable bowel syndrome. Irritable bowel syndrome is a chronic and functional disorder which arises due to anxiety and stressful life. ASD children are prone to more anxiety and depression due to their inability to express their needs or suffering. In this case, also parents have observed that post-intervention frequency of going to the toilet has come down. People suffering from IBS will have tendencies to go to toilet immediately after food taking or whenever they get anxiety due to fear psychosis (Evans, Cousins, Tsao, & Sternlieb, 2011). This study was conducted by a team led by S. Evans involving irritable bowel syndrome patients aged between 14-26 years with Iyengar *Yoga* for six weeks. In this review paper, one of the interventions found the significant result after the intervention. Another review study also shows that among the complementary and alternative therapies, *Yoga* found to be most effective to treat the IBS problems. ASD children may not express of a particular disease, they suffer from only parents can

assume based on the symptoms of the problems, hence in this group also many children suffering from IBS diseases as per the pre-data-collection which shown significant improvement in the post data analysis. People suffering from IBS will have abdominal pain or discomfort at lower abdomen continuously for certain period should be treated for this problem. In one of the previous study conducted by a team lead by Vijaya, Kavuri *Yoga* found to be very effective in treating irritable bowel syndrome (Kavuri, Raghuram, Malamud, & Selvan, 2015). Another study was done by Leora Kuttner with *Yoga* intervention for adolescents suffering from irritable bowel syndrome also found significant effect post-intervention (Kuttner, Christine, Janine, & David, 2006). There are many more studies done to find the effect of *Yoga* as alternate therapy to find a solution to abdominal pain or digestion related problems. A trial was done by Judith for gastrointestinal problem shown the significant value of post-intervention data (Judith, Lize, Mirrian, & Marc, 2016). Some of the *äsana* added in this module like cat posture, *Adho Mukha Swanasana* (downward dog posture), *Ardha Matsyendrasana* (Half spinal twist), *Dhanurasana* (bow pose), *Bhujangasana* (Cobra pose) gives fine stimulation to lower abdominal muscles, improve organs like kidney, liver, and adrenal glands. Digestion problems are co-related with eating habits, but once the digestion related problems solved eating habits are regulated this was observed by parents post *Yoga* intervention with a *Yoga* group (McMahon, 2014). This study has found *Yoga* is most effective in treating eating habits and digestion related problems of ASD children after three months of intensive *Yoga* intervention. At the same time control group children have not shown any change in their severity related to gastrointestinal problems when compared post data collection that of with intervention group.

7.3 Behavior Problems

ASD children mainly for behavior problems until recently till it was found that they are suffering from other problems also like sleep and gastrointestinal disorder (Klukowski et al., 2015). In this study, thirty interview schedule were used collect all behavior aspect of children from their respective caretakers. Data were collected pre and post shown significant improvement after intervention. ASD children not making eye to eye contact improved, attention span and sitting tolerance also improved according to both parents and teacher's observation. Item number twenty-eight, which refers imitating ability which is very vital for any individual to observe and learn others actions is the core component for acquiring social skills. Normal children will start acquiring this ability around one to one and a half years of age. But ASD children lacking this ability make them totally dependent on their caretaker. This was one of the main intentions of this study also so that children learn to imitate as early as possible so that they can perform *Yoga* without depending on their caretakers. It was fifteen days to one month time by which children acquired this ability. This was reflected during the *Yoga* session when of the children started performing *Yoga* with oral instruction as well as through imitating the action as children's eye to eye contact improved. This significant was shown in post-intervention data analysis. This has proved in previous *Yoga* intervention study for ASD children done by Dr. Shantha Radhakrishna in 2010 (Radhakrishna, 2010a). The previous study was done involving six children with a control group and post-intervention shown improvement in imitating skills and eye to eye contact ability. In this study for a week, parents helped children to perform *Yoga* postures with physical help to make them understand and feel how to use the body to adopt different position and balance. From 2nd week parents were asked to reduce physical help by fifty percent. But some

children very young children with attention problem could not understand do *äsana* on their own, for such child's parents continued to help. There were no visually impaired children in this intervention group; hence all the children slowly started looking at either teacher or caretaker. Children who were unable to perform on their own made to stand to face their mothers or caretakers and few children are able to see and adopt Asana stood facing *Yoga* teacher and school teachers standing together in the first row facing children and caretakers. This went on to third and fourth week by this time all the children were able to either hear the instructions by *Yoga* teacher and performing *äsana* or imitation postures looking at their caretakers. *Yoga* helped children learn to imitate ability. *Yoga* helped children achieving body balancing, body posture, body awareness, concentration, fine motor movement, sensory integration, etc. Post-intervention children were able to concentrate on a particular task and complete, focusing on objects according to parents and teachers. In a previous study conducted by again Dr. Santa Radhakrisha in control group study with 6 children in each group proved that Integrated Approach of *Yoga* Intervention ASD children can improve eye to eye contact, sitting tolerance, body posture, body awareness, depth perception and balance, imitation skill, control in self-stimulatory Behavior, receptive skills related to spatial relationships and self-injurious Behaviors (Radhakrishna, 2010b). All these behavior problems are included in this study in the form of the item and have shown significant improvement in post-intervention. In the middle of *Yoga* intervention, it was observed that children were very calm throughout the *Yoga* session, in the classroom as well as at home. Children responding if called by name by turning towards caller and a sense of self-confidence increased. This was proved previously by the previous study by Miriam Behar (Behar, 2006). Post analysis of the group significant result has been found except item twenty-six which is savant ability (extraordinary skills in an individual in a specific area) which comes by birth and has to be identified by teachers or

caretakers. This particular skill requires a longer period of intervention to explore. *Yoga* intervention increased cognitive ability among post intervention as body movement during *Yoga* postures increase effective language learning ability. Increased language and communication skills, social interaction, body balancing and coordination, increased awareness about the surrounding environment, control in behaviors like self-injury, self-stimulation, and the ability to self-calming, building self-esteem are some changes seen and reported by parents and teachers. All these behavior changes have been proved by many previous *Yoga* intervention studies done for ASD children (Kenny, 2002). But previous studies were done with very little *äsana* with a small group of children for shorter periods. This study was intensive *Yoga* intervention involving one of the caretaker and teachers from the school. This study also proved that *Yoga* intervention improves sensory integration of ASD children when compiled pre and post data of *Yoga* group. But control group did not show any improvement in this skill. Sensory integration like seeing, hearing, tasting and certain movement coordination according to the situation are essential for everyone. ASD children who are lacking in this; show significant improvement in post-intervention which was proved in the previous study conducted by James L. Kijowski. Eighty to ninety percent children suffer from sensory integration disorder and Kijowski conducted *Yoga* intervention taking one ASD child and proved the significant outcome (Kijowski, 2008a). Behavior problems are considered as the core symptoms of ASD children until recently, but in this study, it was proved that combined *Yoga* intervention to address different problematic area of ASD children can be successful intervention. In another study done by Manju Deorari in India with involving thirty children, says that three-month *Yoga* intervention can be effective to find significant improvement in behavior problems of ASD children (Manju Deorari, 2017). Post *Yoga* intervention, it was shown that children come out of self-injurious behavior, rigidity, and behaviors like self-

stimulation, which was proved in the previous study done by N Sharma (Sharma & Sharma, 2016). This study proved that intensive *Yoga* intervention can bring a total change in ASD children all areas of problems like sleep, gastrointestinal and behavior problems. *Yoga* cannot be considered as a kind of treatment, but a way of life. *Yoga* should be made routine activity for ASD children to keep the overall development and to lead an independent life with little support.