International Journal of Autism

E-ISSN: 2710-3927
P-ISSN: 2710-3919
IJRSE 2023; 3(1): 06-13

www.rehabilitationjournals.com
Received: 05-10-2022
Accepted: 12-11-2022

Nevil WS
Department of Community Science, College of Agriculture, Vellayani,
Thiruvananthapuram, Kerala, India

Beela GK
Department of Community Science, College of Agriculture, Vellayani,
Thiruvananthapuram, Kerala, India

Correspondence
Nevil WS
Department of Community Science, College of Agriculture, Vellayani,
Thiruvananthapuram, Kerala, India

Impact of Horticultural Therapy in Social Intelligence of people with Autism Spectrum Disorder

Nevil WS and Beela GK

Abstract
Horticultural Therapy (HT) is an interdisciplinary approach to human development that integrates social and behavioral science with horticulture and environment. Autism spectrum disorder is associated with deprived social relationships. Studies has shown that HT can improve social intelligence. Studies on impact of HT on the social intelligence of people with autism is scarce. The present study aims to find the impact of HT in social intelligence of people with autism spectrum disorder. Case study manner with pre- post design was adopted. Ten people with autism were selected from Bud Schools. Through purposive sampling method. Vineland Social Maturity Scale was used to assess social intelligence. The difference between the pre and post scores were analysed. Qualitative analyses was carried out and it was found that six participants showed remarkable changes in the Social Intelligence. Therefore it can be concluded that HT can improve the social intelligence in people with autism spectrum disorder.

Keywords: Horticultural therapy, social intelligence, developmental delay, vineland social maturity scale, social age, social quotient

1. Introduction
Autism Spectrum Disorder (ASD) is a developmental disability caused by differences in the brain. Some people with ASD have a known difference, such as a genetic condition. Other causes are not yet known. Scientists believe there are multiple causes of ASD that act together to change the most common ways people develop. We still have much to learn about these causes and how they impact people with ASD (CDCP, 2020) [8].
Horticultural Therapy (HT) is an interdisciplinary approach to human development that integrates social and behavioral science with horticulture and environment (Beela *et al*., 2010) [38]. Engaging in an authentic and meaningful relationship with plants is more likely to happen when we can quiet our mind and be still. Cultivating a daily meditation practice as part of our daily routine supports our intention to learn how to connect with plants.
ASD encompasses children along with a spectrum of functioning levels (Theibaut *et al*., 2010) [33], in which each child varies inability and impairment (Wicks *et al*., 2006) [37]. HT uses natural materials to implement interventions including soil, sand, water, seeds, plants, and other related materials. The therapist manipulates these materials and activities to fit the specific needs of an individual in the program, making it possible for children of varying abilities to work together. For example, children of various functioning levels can work together to create a vegetable garden by taking on various jobs based on each child's abilities and interests. All children involved in the project can work on sharing, requesting, collaborating, and other social skills needed in group settings. Horticultural settings and projects are applicable to children of all different abilities and the skills gained can be utilized throughout their lives (Simson *et al*., 1998) [30].
HT can help children to improve their communication skills. Many children, regardless of where they lie on the spectrum, struggle with using language in some way or another. Gardening is a physical activity involving the use of the hands; therefore, it does not require much in the way of verbal skills. For those who are completely nonverbal, visual cues and photographs can be used to demonstrate tasks such as how to plant or care for seedlings. Many autistic children have difficulty forming social relationships. Group gardening for kids with autism allows them to learn to work together towards a common goal without the need to converse or behave according to other social standards (Grant, 2022) [14].

The three primary goals of HT program included, greater verbal/gestural communication and interpersonal interactions, to promote the initiative in expressing will and completing a task independently, Improving adaptive behaviors. Activities included sowing seeds, seed collection, plant cultivation, and conservation efforts. There were also activities within the local community, promoting greater social interaction. The results show that these individuals with autism made significant improvements in areas of interaction skills, independence, and adaptive behavior.

2. Materials and Methods

The present study attempts to determine the impact of Horticultural Therapy in social intelligence of people with ASD. A general description of methodology followed in the conduct of the study is presented in this chapter under the following heads:

2.1 Locale of study

The locality of the study was at the Buds Rehabilitation Center, Perumkadavila & Buds Rehabilitation Center, Kunnathukal from Thiruvananthapuram district.

2.2 Selection of the sample

In the present study, the sample comprised of ten person with ASD symptoms both male and female in the age group of 10 – 25 years. Purposive sampling method was used to select the sample.

2.3 Tool used for assessment

Success of every research study depends upon the use of appropriate and well designed tools or techniques to elicit information from the sample care givers and the following tool was used in the present study for assessment.

2.3.1 Tool 1: Social intelligence assessment

Vineland Social Maturity Scale (VSMS) tool was used for the evaluation of social and adaptive functions of the person with autism. Social age and social quotient are calculated using VSMS tool.

2.4 Conduct of study

2.4.1 The study was done in three phases

2.4.2 Pre-Intervention Assessment

The personal and socio-economic characteristics of the samples were assessed using the questionnaire prepared. Pre social maturity assessment was elicited.

2.4.3 Imparting Horticultural Therapy

HT was given through various horticultural activities and person with ASD were encouraged to do horticultural activities like watering, sowing seeds, planting, leaf printing, sand art, flower arrangement, observing the plants, communicating with the plants. The HT was given to the person with ASD at the Buds Rehabilitation Center, Perumkadavila & Buds Rehabilitation Center, Kunnathukal from Thiruvananthapuram district. Activities were mostly given in group setting and assistance was also given for the person who needed that for completing the activities.

2.4.3.1 Horticultural Therapy Activities

The following are the HT activities imparted to the people with ASD.

S.N.	Description of Horticultural Therapy activities
	Outdoor garden activities
1.	Sowing vegetable seeds
2.	Observing the growth of the seeds
3.	Watering
4.	Potting
5.	Planting
6.	Preparing name board for plants
7.	Communicating with the plants
8.	Weeding
9.	Exploring scents in the garden
10.	Nature college or memory box
	Indoor activities
1.	Sand art
2.	Flower arrangement
3.	Leaf printing

2.4.4 Post Intervention Assessment

VSMS tool was used to assess the impact of HT in social intelligence in person with autism after the intervention. All the children were assessed independently by the investigator.

2.5 Data Analysis

The differences of pre and post VSMS scores were compared. Since there were only 10 participants. Descriptive analysis was carried out.

3. Results and Discussion

This chapter presents, describes and discusses the results of the study "Impact of Horticultural Therapy in social intelligence of people with Autism Spectrum Disorder". In order to facilitate better understanding and convenience the discussion of the results of the present study are presented as case 1, case 2, case 3, case 4, case 5, case 6, case 7, case 8, case 9 and case 10. Pre and Post VSMS scores were compared to find the impact of HT. The observations showed that some person with ASD those who participated in the HT programme had improved their social intelligence.

Table 1: Comparison of Social Intelligence before and after Horticultural Therapy (Pre and Post VSMS scores)

Si. No.	Case	Age	Pre SA	Pre SQ	Post SA	Post SQ	SA Difference	SQ Difference
1.	Case 1	16	1.94	12.12	1.94	12.12	-	-
2.	Case 2	22	3.7	16.8	3.7	16.8	-	-
3.	Case 3	21	6.3	30	6.8	32.38	0.5	2.38
4.	Case 4	23	5.8	25.21	7.4	32.17	1.6	6.96
5.	Case 5	25	6.8	27.2	7.2	28.8	0.4	1.6
6.	Case 6	18	2.2	11.1	2.2	11.1	-	-
7.	Case 7	13	5.2	40	5.4	41.53	0.2	1.53
8.	Case 8	17	7	41.1	7.8	45.88	0.8	4.78
9.	Case 9	24	5.4	22.5	6	25	0.6	2.5
10.	Case 10	25	2.7	10.8	2.7	10.8	-	-

Case 1

The respondent was a 16-year-old non-verbal male. He had neither visual reaction nor social smile to a new person. He was not responsive to other people's facial expressions or feelings, and even avoided eye contact. He did not imitate other children at play or never developed any friendships. He did not follow instructions given to him in a single command; hence it was necessary to repeat the instructions to get things done.

Before imparting HT, his social age and social quotient were determined and it was 1.94 and 12.12, respectively. He needed appropriate help to finish the horticultural activities assigned to him as part of HT. Nevertheless, he never requested for help by himself during the activities and sometimes even showed appropriate classroom behaviours. With the investigator's adequate help, he took part in activities including watering plants, sowing seeds, arranging flowers, and observing the plants. He was co-operative and friendly while doing the activities with investigator's support.

After completing HT sessions for a month, he had a social age and social quotient of 1.94 and 12.12, respectively. It indicates that, there is no change in social age or social quotient of the respondent.

Based on the observations collected, it was evident that the boy did not show any changes after exposed to HT. It may be due to his severe developmental delay happened over the years or due to the lack of proper special attention needed for ASD children. In order to comprehend the activities, he required regular assistance. Furthermore, he did not consistently attend HT sessions. Additionally, he required a start-over session each time as a novice. But he was interested in observing the plants. He may exhibit changes in his social intelligence if he receives more HT sessions over the course of a long period of time on regular consecutive days.

It can be concluded in such a way that the severity of developmental delay negatively affects the efforts to create a change in the social intelligence. The result is in line with the research conducted by Greenspan & Love (1997) in children and adult with mental retardation, learning disability and ASD. It revealed that social intelligence deficits are mostly evident in people with mental retardation or even with autism people.

Case 2

The respondent was a 22-year old obese female. She "looks through" people and frequently didn't attend social stimuli. She was very destructive in nature, used only minimum number of repeated phrases (at least 15 but less than 30 spontaneous phrases) to communicate. She quickly forgot even simple tasks she learnt from the activity and was frequently unaware of surroundings.

Before imparting HT, she had a social age of 3.7 and a social quotient of 16.8. She needed proper assistance to complete the horticultural activities assigned to her as part of HT. She requested assistance but was not cooperative during the activities. With the investigator's adequate help, she participated in activities like watering plants, sowing seeds, leaf printing, sand art, planting, and flower arrangement. The HT session lasted for a month.

After completing HT session, she had a social age and social quotient of 3.7 and 16.8, respectively. It indicates that, there is no change in social age or social quotient of the respondent after the activity.

Based on the observations collected, it was evident that the girl did not show any changes after exposed to HT. Throughout the sessions, she displayed distraction and never completed any tasks assigned to her. She repeatedly asked the investigator questions which was not relevant to the HT session and she didn't want to be a part of the HT sessions.

It can be concluded in such a way that behavioural issues negatively affects the efforts to create a change in the social intelligence. It is suggested that she can undergo HT after Cognitive Behaviour Therapy (CBT) sessions. The result is in line with the research conducted by Lickel, A., Maclean, W. E.,Jr, Blakeley-Smith, A., & Hepburn, S. (2012) in the cognitive abilities of ASD kids in comparison to those of typical kids. It reveals that, the ASD children had the skills needed for CBT. They worked on changing their thoughts and were able to differentiate between thoughts, feelings, and actions. The only constraint faced by the authors was they couldn't recognize the respondents any emotions after CBT.

Case 3

The respondent was a 21-year old female who had tremor. She repeated sounds or words and echoes questions or statements made by others. Sometimes painful stimuli such as bruises and cuts happened accidently during the activity evoked no reaction in her.

Before imparting HT, her social age and social quotient were determined and it was 6.3 and 30, respectively. Without the investigator's adequate help, she took part in the horticultural activities that were provided as part of HT. She took part in activities including watering plants, sowing seeds, leaf printing, sand art, planting, flower arrangement, and observing plants. She was co-operative and friendly while doing the activities.

After completing HT sessions for a month, she had a social age and social quotient of 6.8 and 32.38, respectively. It indicates that, there is a change in social age and social quotient of the respondent. After completing HT, the difference observed in the social age and social quotient was 0.5 and 2.38, respectively in a month.

Based on the observation collected, it was evident that the girl shows changes after exposed to HT. It may be due to her participation in the HT session, which encouraged her to participate in activities she typically avoided/not interested such as social engagement. She actively participated in HT sessions that routinely promoted small group social contact. HT in a group provides a secure setting to interact with others and establish friendships. Researches show that, connections and relationships naturally develop in a community that focuses on plant based activities. It can be concluded in such a way that her social intelligence was improved by her active involvement and continuous HT sessions.

A HT setting might encourage a child with ASD to engage in situations usually avoided, such as social interaction. This finding is in line with the work of Simson and Straus. An example of an activity to encourage social interaction among a small group of higher functioning children with ASD could be a group potting task. The activity provides the children with opportunities to work on sharing, taking turns, following directions, and conversing (Simson & Straus, 1998). Children progress further in skill areas once

they generalize the skills to everyday situations (Sunderberg, 2008). Inconsistencies in natural materials and settings may give the child a chance to learn skills with broader comprehension. For example, imitation is a key skill for developing self-help skills (Sunderberg, 2008).

Case 4

The respondent was a 23-year old male who had neither social smile to a new person and nor kept eye contact. He cannot point to more than five named objects and was impatient.

Before imparting HT, his social age and social quotient were determined and it was 5.8 and 25.21, respectively. Without the investigator's adequate help, he took part in the horticultural activities that were provided as part of HT. He took part in activities including watering plants, planting seeds, leaf printing, sand art, planting, and flower arrangement. He was co-operative and friendly while doing the activities. He occasionally asked for assistance during those activities and he behaved appropriately in the classroom and garden.

After completing HT session for a month, he had a social age and social quotient of 7.4 and 32.17, respectively. It indicates that, there is a change in social age and social quotient of the respondent. After completing HT, the difference observed in the social age and social quotient was 1.6 and 6.96, respectively in a month.

Based on the observation collected, it was evident that the boy show changes after exposed to HT. It may be due to his participation in the HT session, which encouraged in activities he typically avoided, such as social engagement. He actively participated in HT sessions that frequently encouraged social contact within small groups. In a group setting, HT provides a safe environment for making friends and interacting with other people. Researches show that, in a community that places an emphasis on plant development, connections and relationships naturally formed. It can be concluded in such a way that his social intelligence was enhanced by his active participation and continuous HT sessions.

A HT setting might encourage a child with ASD to engage in situations usually avoided, such as social interaction. An example of an activity to encourage social interaction among a small group of higher functioning children with ASD could be a group potting task. The activity provides the children with opportunities to work on sharing, taking turns, following directions and conversing (Simson & Straus, 1998). Children progress further in skill areas once they generalize the skills to everyday situations (Sunderberg, 2008). Inconsistencies in natural materials and settings may give the child a chance to learn skills with broader comprehension. For example, imitation is a key skill for developing self-help skills (Sunderberg, 2008).

Case 5

The respondent was a 25-year old male who had avoided eye contact during the activities. He was frequently unaware of surroundings and cannot point to more than five named objects.

Before imparting HT, his social age and social quotient were determined and it was 6.8 and 27.2, respectively. Without the investigator's adequate help, he took part in the horticultural activities that were provided as part of HT. He took part in activities including seed sowing, leaf printing, sand art, planting, flower arrangement, observing plants and communicating with plants. He was co-operative and friendly while doing the activities. He occasionally asked for assistance during those activities and he behaved appropriately in the classroom and garden.

After completing HT session for a month, he had a social age and social quotient of 7.2 and 28.8, respectively. It indicates that, there is a change in social age and social quotient of the respondent. After completing HT, the difference observed in the social age and social quotient was 0.4 and 1.6, respectively in a month.

Based on the observation collected, it was evident that the boy showed changes after exposed to HT. It may be due to his participation in the HT session, which encouraged in activities he typically avoided, such as social engagement. He actively participated in HT sessions that frequently encouraged social contact within small groups. In a group setting, HT provides a safe environment for making friends and interacting with other people. Researches show that, in a community that places an emphasis on plant based activities, connections and relationships naturally formed. It can be concluded in such a way that his social intelligence was enhanced by his active participation and continuous HT sessions.

A HT setting might encourage a child with ASD to engage in situations usually avoided, such as social interaction. An example of an activity to encourage social interaction among a small group of higher functioning children with ASD could be a group potting task. The activity provides the children with opportunities to work on sharing, taking turns, following directions, and conversing (Simson & Straus, 1998). Children progress further in skill areas once they generalize the skills to everyday situations (Sunderberg, 2008). Inconsistencies in natural materials and settings may give the child a chance to learn skills with broader comprehension. For example, imitation is a key skill for developing self-help skills (Sunderberg, 2008).

Case 6

The respondent was an 18-year old non-verbal male. He usually walks on toes and flaps hands. He had neither visual reaction nor social smile to a new person. He was not responsive to other people's facial expressions or feelings and even avoided eye contact. He did not imitate other children at play and never developed any friendships. He hurts self by biting hand. He did not follow instructions given to him in a simple command; hence it was necessary to repeat the instructions to get things done.

Before imparting HT, his social age and social quotient were determined and it was 2.2 and 11.1, respectively. He needed appropriate help to finish the horticultural activities assigned to him as part of HT. Nevertheless, he never requested for help by himself during the activities and sometimes even showed inappropriate classroom behaviours. With the investigator's adequate help, he took part in activities including watering plants, sowing seeds, printing leaves, planting and arranging flowers. He was not co-operative and friendly while doing the activities with investigator's support.

After completing HT sessions for a month, he had a social age and social quotient of 2.2 and 11.1, respectively. It indicates that, there is no change in social age or social quotient of the respondent.

Based on the observations collected, it was evident that the boy did not show any changes after exposed to HT. It may be due to his severe Attention Deficit Hyperactive Disorder (ADHD) and ASD symptoms or due to the lack of proper special attention needed for ASD children. In order to comprehend the activities, he required regular assistance. Furthermore, he did not consistently attend HT sessions. Additionally, he required a start-over session each time as a beginner. He may exhibit changes in his social intelligence if he receives more HT sessions over the course of a long period of time on regular consecutive days.

It can be concluded in such a way that the severity of ADHD and ASD symptoms negatively affects the efforts to create a change in the social intelligence. Multiple Disabilities have unique needs and challenges. Impairments may occur in cognition, motor and sensory functions and occur in combination with each other. Many of these young children struggle to communicate their wants and needs, to freely move their body to access and engage their world and to learn abstract concepts and ideas. The intensity of their needs means that delays are likely to have a pervasive impact on the child's development and are likely to continue to impact the family and the child well beyond the early childhood years (Chen, 1997).

Case 7

The respondent was a 13-year old female who had poor in visual discrimination when learning. She usually flaps hands while doing activities and even avoided eye contact. She was frequently unaware of surroundings and cannot point to more than five named objects.

Before imparting HT, her social age and social quotient were determined and it was 5.2 and 40, respectively. Without the investigator's adequate help, she took part in the horticultural activities that were provided as part of HT. She took part in activities including planting, flower arrangement, watering plants, leaf printing, sand art, observing plants and communicating with them. She was co-operative and friendly while doing the activities. She occasionally asked for assistance during those activities and she behaved appropriately in the classroom and garden.

After completing HT session for a month, she had a social age and social quotient of 5.4 and 41.53, respectively. It indicates that, there is a change in social age and social quotient of the respondent. After completing HT, the difference observed in the social age and social quotient was 0.2 and 1.53, respectively in a month.

Based on the observation collected, it was evident that the girl showed changes after exposed to HT. It may be due to her participation in the HT session and was encouraged in activities she typically avoided, such as social engagement. She actively participated in HT sessions that frequently encouraged social contact within small groups. In a group setting, HT provides a safe environment for making friends and interacting with other people. Researches show that, in a community that places an emphasis on plant based activities, connections and relationships naturally formed. It can be concluded in such a way that her social intelligence was enhanced by her active participation and continuous HT sessions.

A HT setting might encourage a child with ASD to engage in situations usually avoided, such as social interaction. An example of an activity to encourage social interaction among a small group of higher functioning children with ASD could be a group potting task. The activity provides the children with opportunities to work on sharing, taking turns, following directions, and conversing (Simson & Straus, 1998). Children progress further in skill areas once they generalize the skills to everyday situations (Sunderberg, 2008). Inconsistencies in natural materials and settings may give the child a chance to learn skills with broader comprehension. For example, imitation is a key skill for developing self-help skills (Sunderberg, 2008).

Case 8

The respondent was a 17-year old female who had no social smile to a new person and even avoided eye contact. She frequently does not attend to social stimuli and cannot point to more than five named objects.

Before imparting HT, her social age and social quotient were determined and it was 7 and 41.1, respectively. Without the investigator's adequate help, she took part in the horticultural activities that were provided as part of HT. She took part in activities including watering plants, sowing seeds, leaf printing, sand art, planting, flower arrangement, observing plants. She was co-operative and friendly while doing the activities. She occasionally asked for assistance during those activities and she behaved appropriately in the classroom and garden.

After completing HT session for a month, she had a social age and social quotient of 7.8 and 45.88, respectively. It indicates that, there is a change in social age and social quotient of the respondent. After completing HT, the difference observed in the social age and social quotient was 0.8 and 4.78, respectively in a month.

Based on the observation collected, it was evident that the girl showed changes after exposed to HT. It may be due to her participation in the HT session, which encouraged in activities she typically avoided, such as social engagement. She actively participated in HT sessions that frequently encouraged social contact within small groups. In a group setting, HT provides a safe environment for making friends and interacting with other people. Researches show that, in a community that places an emphasis on plant based activities, connections and relationships naturally formed. It can be concluded in such a way that her social intelligence was enhanced by her active participation and continuous HT sessions.

Researchers have found that when using peer models to aid in social skills training with children with autism that the children with ASD increased their social interactions and decreased their repetitive behaviors (Lee *et al*., 2007). A HT setting might encourage a child with ASD to engage in situations usually avoided, such as social interaction. An example of an activity to encourage social interaction among a small group of higher functioning children with ASD could be a group potting task. The activity provides the children with opportunities to work on sharing, taking turns, following directions, and conversing (Simson & Straus, 1998).

Case 9

The respondent was a 24-year old female who had poor use of visual discrimination when learning and even avoided eye contact. She was very anxious while doing activities and cannot point to more than five named objects.

Before imparting HT, her social age and social quotient were determined and it was 5.4 and 22.5, respectively.

Without the investigator's adequate help, she took part in the horticultural activities that were provided as part of HT. She took part in activities including sowing seeds, watering plants, creating sand art, planting, arranging flowers, observing plants and communicating with plants. She was co-operative and friendly while doing the activities. She occasionally asked for assistance during those activities and she behaved appropriately in the classroom and garden.

After completing HT session for a month, she had a social age and social quotient of 6 and 25, respectively. It indicates that, there is a change in social age and social quotient of the respondent. After completing HT, the difference observed in the social age and social quotient was 0.6 and 2.5, respectively in a month.

Based on the observation collected, it was evident that the girl showed changes after exposed to HT. It may be due to her participation in the HT session, which encouraged her to participate in activities she typically avoided, such as social engagement. She actively participated in HT sessions that frequently encouraged social contact within small groups. In a group setting, HT provides a safe environment for making friends and interacting with other people. Researches show that, in a community that places an emphasis on plant based activities, connections and relationships naturally formed. It can be concluded in such a way that her social intelligence was enhanced by her active participation and continuous HT sessions.

A HT setting might encourage a child with ASD to engage in situations usually avoided, such as social interaction. An example of an activity to encourage social interaction among a small group of higher functioning children with ASD could be a group potting task. The activity provides the children with opportunities to work on sharing, taking turns, following directions, and conversing (Simson & Straus, 1998). The activities like planting, watering the plants, and removing the weeds from the farm makes the persons get engaged in the activities that reduces the behavioral problem. The persons with disabilities while performing the horticulture activities interact with each other help each other and in turn the socialization also increases (Kim *et al*., 2012).

Case 10

The respondent was a 25-year old non verbal male. He resisted being touched or held. He had neither visual reaction nor social smile to a new person. He was not responsive to other people's facial expressions or feelings and even avoided eye contact. He usually 'looks through' people and never developed any friendships. He did not follow instructions given to him in a single command; hence it was necessary to repeat the instructions to get things done. Before imparting HT, his social age and social quotient were determined and it was 2.7 and 10.8, respectively. He needed appropriate help to finish the horticultural activities assigned to him as part of HT. Nevertheless, he never requested for help by himself during the activities and sometimes even showed inappropriate classroom behaviours. With the investigator's adequate help, he took part in activities including watering plants, printing leaves, planting, arranging flowers, and observing the plants. He was not co-operative and friendly while doing the activities with investigator's support.

After completing HT sessions for a month, he had a social age and social quotient of 2.7 and 10.8, respectively. It indicates that, there is no change in social age or social quotient of the respondent.

Based on the observations collected, it was evident that the boy did not show any changes after exposed to HT. It may be due to his severe developmental delay happened over the years or due to the lack of proper special attention needed for ASD children. In order to comprehend the activities, he required regular assistance. Furthermore, he did not consistently attend HT sessions. Additionally, he required a start-over session each time as a beginner. But he was playful during the activities and enjoyed throwing materials used in the activities. He may exhibit changes in his social intelligence if he receives more HT sessions over the course of a long period of time on regular consecutive days.

It can be concluded in such a way that the severity of developmental delay negatively affects the efforts to create a change in the social intelligence. The result is in line with the research conducted by Greenspan & Love (1997) in children and adult with mental retardation, learning disability and ASD. It revealed that social intelligence deficits are mostly evident in people with mental retardation or even with autism people. Many of these young children struggle to communicate their wants and needs, to freely move their body to access and engage their world, and to learn abstract concepts and ideas. The intensity of their needs means that delays are likely to have a pervasive impact on the child's development and are likely to continue to impact the family and the child well beyond the early childhood years (Chen, 1997).

4. Conclusion

The present study entitled "Impact of Horticultural Therapy in social intelligence of people with Autism Spectrum Disorder" was conducted with an objective to determine the impact of HT in social intelligence of people with ASD. ASD sufferers may exhibit behavior, communication, interaction, and learning differences from the majority of others. People with ASD can have a wide range of abilities. For instance, some individuals with ASD may be nonverbal while others may have advanced conversational skills. In their day-to-day lives, some people with ASD require a lot of assistance; Others can live and work without much help. Numerous ASD symptoms can be alleviated with the appropriate treatment. The majority of people with ASD experience some symptoms over time. However, they are able to live in the community or with their families.

This research was conducted in ten people with ASD symptoms both male and female in the age group of 10 – 25 years. The samples were selected from Buds Rehabilitation Center, Perumkadavila & Buds Rehabilitation Center, Kunnathukal from Thiruvananthapuram district. HT was given through various horticultural activities and person with ASD were encouraged to do horticultural activities like watering, sowing seeds, planting, leaf printing, sand art, flower arrangement, observing the plants and communicating with the plants. The tool used for assessing social intelligence in person with ASD before and after HT was VSMS.

The study was carried out in three phases, the first phase was the pre intervention where the social intelligence of the people with ASD was assessed. In the second phase HT was imparted. Finally in the third phase, the post intervention assessment was done, where the social intelligence of the person with ASD after HT was assessed.

The study reveals that there was increase in social intelligence in person with ASD who actively participated in HT consistently. Six out of ten samples have increased social intelligence. Case 1, Case 2, Case 6 & Case 10 doesn't have any change in social intelligence even after for a month. Not actively participating in HT consistently is one of the major reason why we couldn't find any change in social intelligence among the four cases. The present study reveals that ASD symptom severity, developmental delay, lack of support from parents and unavailability of other therapies may be the etiology of not seeing changes in social intelligence in people with ASD who were enrolled in the HT progrmame for a period of one month.

This research was done in a short period of time and less samples were taken for observation, so it is recommended that future researches need to focus on the same area with larger samples. Person with ASD fall into a range of functioning levels, with each child having varying impairments and abilities. For HT's interventions, natural materials like soil, sand, water, seeds, plants, and other related materials are used. Children of varying abilities can collaborate because the therapist adapts these materials and activities to each participant's specific requirements. For instance, children with varying levels of functioning can collaborate to create a vegetable garden by performing various tasks based on each child's interests and abilities. The project gives all of the kids a chance to practice sharing, asking for help, working together, and other social skills that are important in groups. Person of all abilities can participate in horticultural settings, projects and the skills they learn can be used throughout their lives.

HT offers a unique environment that helps individuals develop the skills they need to grow and thrive. The wonderful thing about HT is that it provides opportunities to honor individual strengths and preferences while sharing enjoyment with others. Individuals with autism can be approached through HT. This allows them to slowly go outside of their comfort zone without feeling overwhelmed. The three primary goals of HT program included, greater verbal/gestural communication and interpersonal interactions, To promote the initiative in expressing will and completing a task independently, Improving adaptive behaviors. Activities included sowing seeds, seed collection, plant cultivation, and conservation efforts. There were also activities within the local community, promoting greater social interaction. The results show that these individuals with autism made significant improvements in areas of interaction skills, independence and adaptive behavior. It can be concluded that HT can increase the social intelligence of people with ASD. It is also recommended that the period of imparting HT should be for a longer period.

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