Original Article:

TEACCH and SIT Approach Program in Children with Autism Spectrum Disorders

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Abstract: Objective: Sensory Integration Therapy (SIT) is one of the most commonly used treatment approaches for Autism Spectrum Disorders (ASD). Treatment and Education of Autistic and related Communication-handicapped Children (TEACCH) is another less known approach in Iran. The aim of this study was to compare the effectiveness of SIT and TEACCH approaches in children with ASD. Design: The study design was quasi- experimental, which was conducted on 2014 in Autism center of Bushehr city, based in south of Iran. Method: Study participants were children aged 3 to 9 with normal IQ who were diagnosed with ASD. Intervention included SIT and TEACCH treatment approaches for a 6 months duration to two groups of children (n=20). One group did not receive any intervention during the 6 months. Main outcome was the total score of Autism Treatment Evaluation Checklist (ATEC). Results: There was no significant difference in ATEC score between the three groups at the base line. ATEC score was significantly different among three groups after intervention using one-way ANOVA test. Tukey test showed that TEACCH group had more improvement in autism score compared to SIT group. The results of ANCOVA test showed that 70% of variation in autism score is due to the interventional approaches. Conclusion: This study showed that TEACCH program was effective in Iranian culture as well, and can be used widely in Iranian Autism centers and TEACCH program was more effective than SIT program.

Key Words: Autism, Sensory Integration Therapy, TEACCH, Iran

Introduction:
Autism was first described by Kanner in mid-1940 decade. (1) However, confusion in diagnostic criteria and large spectrum of signs and symptoms of autism has resulted in creating a more recent term 'Autism Spectrum Disorders (ASD)'.(2) ASD are among the most severe developmental disabilities' (American Psychological Association), which are characterized by abnormalities in communication and social interaction, as well as 'repetitive and stereotyped behaviors and interests'.(3) ASDs are lifelong condition and a high proportion of individuals with ASD require lifelong full-time care and only around 15% of adults with autism will live independently.(3) The common diagnostic criteria for ASD are the Autism Diagnostic Interview-Revised (ADI-R), which is a semi-structured, interviewer-based questionnaire for the primary caregiver, and the Autism Diagnostic Observational Schedule.(3)

The prevalence ASD is about 1 to 2.5% of children in the general population (4,5) and the number of diagnosed cases of ASD has been increased in recent decades.(6) Many treatment approaches have been developed for ASD, which attempt to reduce the symptoms of the disease and help autistic children to function in the least restrictive way in their daily, academic and social life and to improve their cognitive abilities and to reduce the typical repetitive behavioral pattern and to develop their full capacities.(7-9)

Most children with ASD have unusual behavior in responding to ordinary auditory, visual, tactile, and oral stimuli or 'sensory behavior' (7-9), although it is not a part of the diagnostic criteria.(10) This 'sensory behavior' is attributed to a defect in the processing and integrating sensory stimuli in nervous system (11), however yet the underlying mechanism is not fully known.(10) Therefore, Sensory Integration Therapy (SIT) is one of the most common treatment approaches for children with ASD.
In SIT, specific forms of sensory stimulation in the controlled dosage in activities like playing is given to the child in order to improve the nervous system's ability to process sensory stimuli and result in reductions in sensory problematic behavior and increase the learning ability of the child (9,12). In SIT, different activities like being brushed/ rubbed or touched with various instruments, swinging, sitting on a bouncy/yoga ball, or riding a child walker or carrying some weight or wearing a weighted vest are used in order to improve the sensory reactivity in the child.(10) Yet, there is no certainty about SIT effectiveness, against being commonly used as a part of routine treatment approach for ASD.(10)

The TEACCH (Treatment and Education of Autistic and related Communication-handicapped Children) program is an approach that supports the individual’s ability to learn, comprehend, and apply learning across situations.(13) A close cooperation and working relationship between parents and practitioners are necessary in TEACCH program. Also in this approach the treatment is tailor made based on particular characteristics and abilities of each child and structured teaching experiences is used for each child. (14)

TEACCH program uses a series of standardized tests to identify the child abilities level and then based on that a curriculum for structured teaching and skill enhancement (such as daily living, communication, language, social, executive functioning, attention, and engagement skills) is developed, in an environment that consider optimizing learning and avoiding frustration. (13,15, 16) There is consensus that the TEACCH is effective, however yet, its effectiveness is not proved by strong evidences from RCTs or cohort studies. (14)

In Iran prevalence of autism has been estimated to be 6.26 per 10,000 for typical autism in a nationwide study among five-year-old children. (17) ASD not only adversely affect the normal growth and independent life of individuals, but it affects the whole family life, and the case is more severe, especially in low-and middle-income countries with limited access to professional support services. (18) Also, previous studies have shown that cultural elements influence the effectiveness of different treatment approaches. (19,20)

Therefore, this study was conducted in order to compare the effectiveness of SIT and TEACCH approaches (two of the available non-pharmacological approaches) in children with ASD for the first time in Bushehr city of Iran.

**Methodology**

**Study design**

A quasi- experiment was conducted during the year 2014 in the sole Autism center of Bushehr city, south of Iran, to compare the effectiveness of SIT and TEACCH approaches in children aged 3 to 9, which were diagnosed with ASD.

**Participants**

The study participants included all children aged 3 to 9 with an IQ in normal range who were diagnosed having ASD in the autism center of Bushehr city children with any other diagnosed syndrome or chronic diseases rather than ASD were excluded of the study.

Among totally 67 eligible children in this center, parents of 40 children gave consent that their children participate in the study and accepted to cooperate with the study, among the rest parents of 20 children gave consent that their children participate in the study but did not accept to comply with the study procedure, these children were considered as control for the two interventional groups.

**Intervention**

Intervention included two treatment approaches (SIT and TEACCH) which were given for a 6 months duration to two groups of children (SIT group and TEACCH group) and one group did not received any intervention during the 6 months (control group).

In SIT group, for improvement of tactile, vestibular and proprioceptive senses and bilateral motor coordination, 60 sessions of different activities were offered to the children, which were as follow:

- **Roundabout the wall:** Child were asked to stand near by a wall and turn around, while the upper body part is in contact with the wall, in one direction for 10 meters and then turn in opposite direction for 10 meters.
- **Roller:** Child is rolled by a yoga ball while sleeping prone.
- **Yoga ball:** Child tried to move on a yoga ball from hand to knee five times, while was lying prone on the ball.
- **Quicksand:** The child was taught to pretend that it is on sand but try to crawl on all fours, while the practitioner was trying to create resistance by pressuring the thighs, knees, ankles, or shoulders of the child slightly for 20 seconds.
- **Tug-o-war game:** Each child played tug of war for 5 second with a child with the same weight.
- **Sit down and take:** Child tried to catch a ball, which was thrown toward him/her with both hand (minimum 4 times out of 5 times), while sitting.
- **Imitate a dog:** The practitioner and children moved on all fours and then they try to balance themselves on two legs and one hand, and then one leg and one hand.
- **Bouncing:** The child was bouncing on two legs or each of legs for 30 second.
- **Chasing the child:** Practitioner chased the children by rolling a yoga ball, while the child was lying prone on a child walker and was trying to move by both hands for 10 meter (20 seconds).

In TEACCH intervention group, children abilities and characteristics were assessed based on their educational information and history, ability / interest, inability / weaknesses, skills to organize and social interaction for duration of one month. In assessment the level of independence and self-reliance of children was considered in an informal and practical way. Then based on the above mentioned assessment a structured educational program was developed for each child and assigned to each child.

The 6 months TEACCH program included:

- **Session one to twenty:**
  - **Children's one-month assessment on the basis of normal growth criteria.** Pervasive Developmental Disorders Screening Test, observing and working with children in the class, taking notes of the level of interaction and communication ability, capabilities and weaknesses of each child, and the ability to learn and emulate; and conditioning small children to carry out activities requested by researchers, educators and parents.
  - **Session 21 to 23:** Providing the necessary explanations to parents to cooperate with the investigators, acquainting them with the structured training and physical structure of the class and how to implement it at home.
  - **Session 24 to 26:**
    - **Session 24 to 26 was devoted to preparing a visual framework (cart) by images or drawing and its writing at the bottom of each card and to redesigning the physical environment of the classroom in a way that the arrangement of furniture and tools available in the class be in such a way that add a meaning or context to the class environment which included reducing stimulant in the class (movement, noise, color, light, smell ...), dividing the class into different sections, defining every area and sector and creating a barrier for children which could be understood by them, organizing spaces in such a way that all children could be seen at any time.
    - **Session 25 to session 60:** In these sessions the activity carts were given to the children by a routine specific sequence based on doing a less pleasant activity followed by a more pleasant...
activity like tying shoelaces and then playing computer game. Some examples of given activities included tying shoelaces, going to the gym, going to the park or playground, following the hand washing orders, brushing, dressing up. There were some rewards after completion of each task or activity. This training schedule was followed by practitioner and parents at home.

Randomization
Stratified randomization strategy was used. All eligible children were divided based on their age group, child order and economic status into two interventional matched groups. Then each group randomly was assigned to either of the two treatment approaches. The control group was selected as explained above among children that their parents did not accept to be a part of the study procedure but gave consent that their children participate in the study.

Data collection
Data was collected at baseline using a data collection form including demographic information of the child and family and Autism Treatment Evaluation Checklist (ATEC) (21,22). Checklist was filled at base line and end of intervention by parents of the children. This checklist designed to be administered by lay informants (by parents, teachers, or others who see the individual's behavior on a regular basis). Total scores can range from 0 to 180 and the higher score, the more impaired the participant. The ATEC has been used to measure treatment progress over time in several studies in ASD.(23,24) This questionnaire is translated and validated in Persian.(25)

Economic status was measured by the income level of the family. If the income of the family was lower than 10000000 Rs (approximately 300 USD) it was considered as low, if it was between 10000000 Rs and 20000000 Rs (approximately 3000 OUSD) it was considered as medium and if it was more than 20000000 Rs (approximately more than 600 USD) it was considered as high.

Outcomes
Main outcome was the total score of ATEC showing the level of abnormality of the children.

Blinding
The data collector was not aware of the intervention allocation group for each child.

Statistical Methods
Data were presented as mean (SD) or frequency (%). The differences of variables across groups were tested by ANOVA, and χ² tests (for categorical variables). ANCOVA were used to examine the differences of effectiveness of treatment adjusting for pre intervention ATEC score and socioeconomic variables. Also to study the impact of age on the effectiveness of interventions, pre and post intervention changes test were repeated for children at age of 3-5 and 6-9 years old (median as a cut point).

Results
Sixty children diagnosed with ASD which met inclusion and exclusion criteria, participated in this study. There were no cases of follow up among the participants. Mean age of children was 5.15±1.7 and 41.7% (n=25) of children were the first child of the family and 36.7% (n=22) had medium economic status (Table 1).

Table 1 shows comparison of children characteristics and the ATEC score at the baseline level. There was no significant difference in the age of children, economic status, child order in the family children and ATEC score at the base line between the three groups (Table 1).

We found that both intervention had significant improvement in the ATEC score (P<0.01). One-way ANOVA test yield that amounts of these change were significantly differed among three groups (Tukey test more improvement in TEACCH group than SIT group- Table 2).

Table 2: Comparing the ATEC score improvement among children with ASD that participated in the TEACCH & SIT approach intervention programs

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre test [Mean (SD)]</th>
<th>Post test [Mean (SD)]</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIT</td>
<td>99.01 (13.3)</td>
<td>75.15 (8.6)</td>
<td>P&lt;0.01</td>
</tr>
<tr>
<td>TEACCH</td>
<td>106.05 (10.9)</td>
<td>78.4 (12.0)</td>
<td>P&lt;0.01</td>
</tr>
<tr>
<td>Control</td>
<td>110.05 (8.9)</td>
<td>120.07 (15.9)</td>
<td>P=0.05</td>
</tr>
</tbody>
</table>

The present study was the first study in Iran that compared the effectiveness of SIT and TEACCH, two commonly used treatment approaches for ASD children. This study showed that both approaches were effective in reducing autism symptoms as measured by ATEC. Similarly, several previous studies have shown that SIT is effective in reducing autism symptoms in children with ASD.(26,27) However Lang et al.
in their systematic review of sensory integration therapy for ASD showed that evidences could not ascertain usefulness of SIT in the education and treatment of children with ASD unless it is used in carefully controlled research.(10) Also several studies showed effectiveness of TEACCH program in treatment of children with ASD with different cultural background.(28-31)

This study showed that the effect of SIT and TEACH were more on children at younger age group. Similarly, the need for early intervention and effectiveness of different treatment approaches at younger age groups have been reported frequently, previously (32,33), which shows the importance of diagnosis and treatment of autistic children as early as possible. However, there is no consistency about importance of age in treatment outcome of children with ASD, a study by Eikeseth et al. on treatment outcome for children with autism who began intensive behavioral treatment between ages 4 and 7 showed that age did not predict the treatment outcome, however the age range in the study of Eikeseth et al (34) was very narrow.

The small sample size and not having a randomly selected control group are the main limitations of this study which limit the generalizability of this study. Further studies with larger sample size are required to confirm the results obtained in this study.

In conclusion the main finding of study was that TEACCH program was more effective than SIT program. As per our knowledge this has not been reported. Also this finding showed that TEACCH is effective in Iranian culture as well and can be used widely in Iranian Autism centers.

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