Study of the effectiveness of comprehensive, timely, and family-oriented interventions in reducing the symptoms of autism in children

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Abstract

Background and Objectives: The onset of rehabilitation interventions in children with autism spectrum disorder below 5 years old has been associated with the reduction of autism symptoms in all developmental domains. The present study aimed to illustrate the importance of early family-oriented interventions in the reduction of the problems and symptoms of children with autism spectrum disorder. **Methodology:** This study was a pretest-posttest clinical trial without a control group. Fifty patients were selected using a convenience sampling method, of which forty patients were male and 10 females with a mean age of 3.2 ± 1.4. The efficacy assessment was evaluated using the Autism Behavior Checklist (ABC) and the Autism Treatment Evaluation Checklist (ATEC) as pretest and posttest. Data were analyzed by independent T-test using SPSS software. **Results:** The difference between pretest and posttest was significant in all aspects of the ATEC test (communication, health, sensory and cognitive awareness, socialization) at the level of $P < 0.001$. Moreover, the difference between pretest and posttest was significant at $P < 0.001$ for the aspects of speech, social and communication, and general performance, and at $P < 0.002$ for the sensory processing. **Conclusion:** Timely interventions under 6 years old with an emphasis on family-oriented and growth aspects over one year can help autistic children in the aspects of speech, social and communication, sensory processing, and sensory and cognitive awareness.

Keywords: Autism spectrum disorder, comprehensive interventions, family-oriented, timely interventions

Introduction

Autism is a neurodevelopmental disorder, occurring in the ages under 3 years old. Deficits in communication and social skills and having stereotypical and repetitive patterns of behaviors, interests, and activities are two major symptoms of this disorder. The prevalence of this disorder is 1 in 59, with boys to girls ratio of 4 to 1.[1]

Autism spectrum disorder has no known causes and is generally thought to be occurred due to genetic and environmental factors. Accordingly, it is not possible to consider a specific treatment for it. However, specialists have developed various rehabilitation and educational methods to improve the communication, behavioral, educational, motor, speech, and social skills of these children. Over than 50 general and specific interventions are developed for autism spectrum disorder, including applied behavioral analysis (ABA), floor time, sensory integration, nutritional approach, music therapy, picture exchange

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communication systems (PECS), developmental intervention model or Green Span approach, the model of "Treatment and Education of Autistic and related Communication handicapped Children (TEACCH), UCLA young autism project, learning experience and alternative program (LEAP), Denver model, comprehensive treatment models (CTMs), and telehealth.[2-5] Owing to the spectral nature of this disorder, many differences may be seen between individuals. However, a comprehensive and coherent set of interventions seems to be necessary for all children with autism. Comprehensive interventions are defined as those interventions which are focused on the underlying causes of autism spectrum disorder and include linguistic, social, cognitive, motor, and play interventions.[6]

There are numerous intervention programs suggested that the interventions should be initiated at early age due to higher effectiveness and appropriate growth levels.[7,8] Early interventions before the age of 5 can alter the abnormal growth of autistic children and modify the child's behavioral development. These early interventions are especially important in the speech and cognition areas, reducing harmful behaviors, and severe symptoms of the disorder. Ultimately, these interventions lead to independence, improved occupational and social performance in adulthood.[6,9] Moreover, various studies have shown that 50% of autistic children who received the interventions achieved some progress in speech. However, if these interventions are conducted before the age of 5, this rate could be higher up to about 75%–95%.[9,10]

Green, Brennan, and Fein[11] defined the effective factors of a timely intervention as a comprehensive program that emphasizes all aspects of growth, is sensitive to the growth sequence, makes use of the validated training strategies such as (ABA), results in reduced annoying behaviors, and involves parents in the intervention process.[9,12,13]

Other investigations have also pointed to other timing and humanistic factors involved in the intervention, including: Facilitating the gradual transition to the natural environment, the use of trained personnel, the implementation of the supervisory process and review during the intervention. If the introduced criteria are met, up to 50% can be effective for growth.[6,7,12,13-16]

An important component of scientific evidence-based practice is that family priorities be involved in the design and implementation of interventions. In this way, their participation in interventions, goal-setting, and enhancing knowledge and information about the disorder leads to increased satisfaction and decreased stress among them (Pasco, 2018).[5] The importance of family-oriented interventions suggested for people with autism has been emphasized by numerous studies which suggested that parents should be responsive to their communication patterns,[12] follow their children interests,[13] and emphasize the increase of parent-child interaction.[17]

The importance of this issue has been emphasized in international research of various countries, and the authorities have attempted to intervene in a timely fashion and line with the growth sequence. However, there is a lack of research resources in this regard in Iran. The study of Hojjati[10] was only research that examined the efficacy of timely interventions on children with autism, but their study was performed in a short period of several months. The purpose of this study was to evaluate the efficacy of early comprehensive treatment in the reduction of the problems and symptoms of autistic children under 5 years old who were first diagnosed and received no treatment in Iran.

Methodology

Sampling

This study was a pretest-posttest clinical trial without a control group. The statistical population consisted of children with autism spectrum disorder who were referred to or admitted in the Iran Autism Association since May 2016 to diagnosis, evaluation and treatment and rehabilitation. Among them, a sample consists of fifty children who were recently diagnosed with autism were selected using a convenience sampling method, of which forty patients were boys and 10 were girls with a mean age of 3.2 ± 1.4 years [Table 1]. Criteria for entry into this project were: the child having had less than 6 years old, having received no intervention before, and having diagnosed with autism for the first time. Exclusion criteria were: metabolic disease, genetic disease, major physical disease, and major neurological disease.

Method's procedure

After the project was approved by the Iranian Ministry of Health, and after calling for participation in the project, those with less than 5 years old who were referred to the Support Unit of Iranian Autism Society were introduced. Following the initial interview with parents, families with necessary prerequisites for entry were introduced to the rehabilitation unit. In a meeting attended by families, project executives, and therapists, the importance of this course was discussed. At the end of the meeting, the forms of informed participation in the project were given to the families, and the specified time for the test was declared. After performing the GARS and M-CHAT tests, the participants were examined by a child and adolescent psychiatrist. Therapeutic sessions for children began after the families were introduced to the project and the children evaluated by a team consisting of occupational therapists, speech therapists, psychologists, social workers, and family counselors. Then, the children were assessed by the Sensory profile 2 test, Communication and Thinking Assessment and Training Program, ATEC, and ABC.

A total of 6 rehabilitation sessions were considered per week, including 2 sessions of sensory-motor and mental occupational therapy, 2 sessions of behavioral therapy and 2 sessions of speech therapy. Monthly workshops on parenting skills, occupational therapy interventions for children, speech therapy interventions in children, introduction to nutrition in the autism

Table 1: Frequency distribution of demographic variables

Variable	Frequency	Percent
Sexuality		
Boy	40	80
Girl	10	20
Birth order		
First	35	70
Second	12	24
Third and higher	3	3

	Father	Mother	Percent	Percent
Parental education				
Elementary	0	1	0	2
High school	5	2	10	4
Diploma	15	20	30	40
Associate's degree	5	7	10	14
Bachelor's degree	18	15	36	30
Master's degree	7	5	14	10

spectrum, cognitive interventions in children, and behavioral interventions in children were carried out for parents. Moreover, at the end of every 6 months, the interventions were evaluated by a child and adolescent psychiatrist, an occupational therapist, and a speech therapist and the feedbacks were referred to the team members. Finally, after one year and at the end of the project, the children were evaluated by a child and adolescent psychiatrist and the treatment team, and the ATEC and ABC tests were completed.

Questionnaire

Autism therapy evaluation checklist (ATEC)
This tool was designed by Remland and Adelson (1999) to evaluate any type of intervention therapy in autism.[18] This checklist is treatment-sensitive. It has enough sensitivity to measure the status alterations of an autistic child and the treatment of autism. The test consists of 52 items with 3 options and 25 items with 4 options. The list includes 4 subscales of sensory/cognitive awareness, socialization, speech and communication, and physical health behavior. Cronbach's alpha obtained for the reliability of each subscale was 0.92, 0.83, 0.87, and 0.81, respectively, and for the overall score was 0.94. The Iranian version of this test was organized by Heravi-Karimooi *et al.* (2018) to investigate the psychometric indicators of this tool by calculating Cronbach's alpha of 0.86–0.93 and its validity content of 0.38–0.79.[19]

Autism behavior checklist (ABC)
This tool is designed to determine the developmental status of motor skills in children with a focus on identifying delayed or defective development of motor skills. This test, developed by Henderson and Salgren, is a revised version of the Tommy test with the idea of the Oseretsky test. It is a standard-reference test that assesses motor function in children with 4 to 12 years old. The test consists of 32 tasks divided into 4 groups of eight. Content validity is confirmed using the CVR method. The validity of the test structure showed that the reliability coefficient in the seven tasks was higher than 0.9.

Gilliam autism rating scale (GARS)
This test was developed in 1994 by Gilliam. The results of recent studies show an alpha coefficient of 0.9 for stereotyped behaviors, 0.89 for communications, 0.93 for social interactions, 0.88 for growth disorders, and 0.96 for the semantics of autism.

Modified checklist for autism in toddlers (M-CHAT)
This test was reviewed by Inada *et al.* (2010) in Japan.[20] The results of their study indicate the appropriateness of psychometric indicators of this test. The reliability of this test was 0.99 using the test-retest method.

Sensory profile 2 test
This test, published by Winnie Dunn in 2014, is an auxiliary tool[21] to assess patterns of child's sensory process in environments such as home and school, and the activities that the child performs in the community. It is applicable from birth to age 15.

Communication and thinking assessment and training program
This test has been used to examine the communication and social interactions domains of children aged from 2 to 20 years. This test has first been developed and implemented by Dr. Farhangdoust. The items are scored according to the Likert spectrum (not at this level, never, rarely, sometimes, often and always). Descriptive statistics were used to describe the data, and independent *t*-test was used to evaluate the differences before and after the project implementation.

Results

The results of Table 2 shows that there is a significant difference ($P < 0.001$) in all aspects of the test. According to the results of the ATEC test, children with autism showed significant differences in terms of communication, health, sensory and cognitive awareness, and socialization, before and after the completion of the project.

The results of Table 3 show that there is a significant difference ($P < 0.001$) in all aspects of the test. According to the results of the ABC test, children with autism showed significant differences in terms of speech and language function, sensory processing, social and communication performance, and overall performance, before and after the completion of the project.

Discussion

The purpose of this study was to evaluate the effectiveness of comprehensive interventions in the reduction of the problems and symptoms of children under 5 years old with an autism spectrum disorder. The results showed that timely interventions at sensitive growth ages of children with an emphasis on family-oriented and growth aspects over one year can help autistic children in the aspects of speech, social and communication, sensory processing, and sensory and cognitive awareness. This is in line with the findings of Dawson,[9] Sally *et al.*,[6] and Hojjati

Table 2: Comparison of autism aspect scores based on ATEC test				
Variable	The mean of Pretest	The mean of Posttest	Effect of treatment	
			T statistics	Significance level
Communication	13.7±8.95	10.4±8.86	13.65	*P*<0.001
Health	19.5±7.72	14.6±7.27	9	*P*<0.001
Sensory and cognitive awareness	16.3±6.05	13±6.3	13	*P*<0.001
Socialization	12.64±6.07	9±6.07	9.02	*P*<0.001

Table 3: Comparison of autism aspect scores based on ABC test				
Variable	The mean of Pretest	The mean of Posttest	Effect of treatment	
			T statistics	Significance level
Speech and language function	27.7±3.05	24±2.7	14.2	*P*<0.001
Sensory processing function	19.8±3.11	17.4±2.59	4.27	*P*<0.002
Social and communication performance	27.9±5.21	25.5±4.88	7.06	*P*<0.001
Overall performance	139±15.50	123±15.93	31	*P*<0.001

and Khalilkhaneh.[10] The comprehensive treatment in this study focused on the main symptoms of autism disorder. The results of this study showed that interdisciplinary teamwork along with conducting joint meetings of a psychologist, occupational therapist, and speech therapist with a child psychiatrist led to significant improvement in children, which is consistent with the findings of Sally *et al.*[6] study. Compared to other plans focusing only one aspect of growth, these comprehensive interventions consider all aspects of a child's developmental stage simultaneously and at a specific period, leading to more rapidly improving, which is in line with the findings of Dawson,[9] and Hojjati and Khalilkhaneh.[10] This study also confirmed the importance of family involvement in the intervention process. The therapists and trained counselors informed the families of the intervention processes and conducted workshops on the concepts and topics of ongoing interventions for which the parent-child interaction was the most important part. This is consistent with the research by Pennefathera *et al.*[13] and Odom *et al.*[15] Another success factor of this research project was the selection of children with an average age of 3 years, which appears to be due to the high capacity of their brain in quick learning, growing, and recovery. These results are also in line with the research by Matthews *et al.*[12] and Hamadneh *et al.*[7] The key success factors of this study include: having a specific therapeutic and scientific framework, specifying a long-term period of one-year for interventions, family-oriented interventions, initiating the research for children with autism in early ages, emphasizing the growth chain, and consulting with the Ministry of Health.[14]

Limitations

There were a few main limitations of the project. It is recommended that a more comprehensive study be performed with more samples of children with autism spectrum.

Recommendations

It is recommended that a more comprehensive study be performed with more samples of autistic children over a longer period.

Moreover, comprehensive treatment is suggested to be performed in health centers, where screening for children is performed at a very early age, and the outcomes are evaluated in infants.

Conflicts of interest

There are no conflicts of interest.

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