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EFFECTIVENESS OF SENSORY INTEGRATION THERAPY IN CHILDREN WITH AUTISTIC SPECTRUM DISORDER - AN EXPERIMENTAL STUDY

Vandana J. Rathod[1], Kinjal S. Mehta[2], Jagatheesan Alagesan[1], Kavya S. Kamalamma[3]

[1]College of Physiotherapy, Sumandeep Vidyapeeth, Vadodara
[2]Asian Child Neuro Clinic, Ahmedabad
[3]Alva's College of Physiotherapy, Rajiv Gandhi University of Health Sciences, Bangalore

E-mail of Corresponding Author: vannu6686@gmail.com

ABSTRACT

Introduction: Autistic Spectrum Disorder (ASD) is spectrum of psychological condition, characterized by widespread abnormalities of social interaction and communication as well as severely restricted interests and highly repetitive behavior. Cognitive behavior therapy is effective in children with ASD. But data are lacking to prove efficacy of sensory integration therapy in treating the children with ASD.

Method: An experimental study was carried out in the outpatient department of a physiotherapy college in Karnataka, India. 20 patients with Autistic Spectrum Disorder (ASD) were included in the study. They are randomly assigned into two groups. Group A: 10 (cognitive behavior therapy alone) and group B: 10 (sensory integration therapy and cognitive behavior therapy). The outcome measure used was Childhood Autism Rating Scale (CARS) and the study was conducted for Six months. **Result:** There was a significant decrease inCARS score ($p<0.001$) in children with ASD who received Cognitive Behavior Therapy alone and combined therapies of Sensory Integration Therapy and Cognitive Behavior Therapy.

Conclusion: Cognitive Behavior Therapy alone and combined therapies of Sensory Integration Therapy and Cognitive Behavior Therapy are effective in decreasing the symptom severity and maladaptive behaviors through CARS (Childhood Autism Rating Scale).

Keywords: Autistic Spectrum Disorder, Cognitive Behavior Therapy, Sensory Integration Therapy.

INTROCUCTION

Autistic spectrum disorders (ASD) is a spectrum of psychological condition, characterized by widespread abnormalities of social interaction and communication as well as severely restricted interests and highly repetitive behavior.(1)

The main three forms of ASD are: Autism, Asperger syndrome, Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), sometimes called Atypical Autism. Other sources also include Rett Syndrome and Childhood disintegrative disorder which share several signs with autism but may have unrelated causes. (2, 3)ASD, in turn, is a subset of the broader autism phenotype (BAP), which describes individuals who may not have ASD but do have autistic-like traits, such as avoiding eye contact.(4)ASD is highly variable neurodevelopmental disorder,(5) that appears during infancy or childhood and generally follows a steady course without remission.(6) ASD, in turn, is a subset of the broader autism phenotype (BAP), which describes

individuals who may not have ASD but do have autistic-like traits, such as avoiding eye contact.

Social deficits, communication problems(echolalia or reverse pronouns) and repetitive or restricted behavior like stereotype (such as hand flapping, making sounds, body rocking etc.), restricted behavior (limit in focus, interest or activity), self injury (such as eye pocking, hand biting, head banging) are commonly related with ASD.Sensory abnormalities are found in over 90% of those with autism and are considered core features.Many ASD children are sensitive to some sounds, textures, smells, tastes.[7-9]A 2007 study interviewed parents of 67 children with ASD and reported that about two-thirds of the children had periods of severe tantrums and about one-third had a history of aggression, with tantrums significantly more common than in non-autistic children with language impairments.[8]

It has long been presumed that there is a common cause at the genetic, cognitive, and neural levels for autism's characteristic triad of symptoms.[10]Deletion, duplication and inversion are all chromosome abnormalities that have been implicated in autism.[9] Autism has a strong genetic basis, although the genetics of autism are complex and it is unclear whether ASD is explained more by rare mutations with major effects, or by rare multigene interactions of common genetic variants.[10,11]

Autism's symptoms result from maturation-related changes in various systems of the brain. How autism occurs is not well understood. Its mechanism can be divided into two areas: the pathophysiology of brain structures and processes associated with autism, and the neuropsychological linkages between brain structures and behaviors.Postmortem and MRI studies have shown that many major brain structures like cerebellum, cerebral cortex, limbic system, corpus callosum, basal ganglia are implicated in Autism.[12]

Diagnosis of autism is based on behavior, not causes or mechanism.[13,14]However, there is increasing suspicion that autism is instead a complex disorder whose core aspects have distinct causes that often co-occur. DSM IV, Autism Diagnostic Interview- revised (ADI-R) and the Autism Diagnostic Observation Schedule (ADOS) uses observation and interaction with the child. But the Childhood Autism Rating Scale (CARS) is used widely in clinical environment to assess severity of autism based on observation of child. CARS was administrated to all behavior with respect to relating to people, imitation, body use, adaptation to change, intellectual response etc. Each item is scored on a continuum from normal, scored as 1, to severely abnormal and /or inappropriate scored as 4. Scores for all the 15 items are summed to yield a total score that ranges from 15 to 60. The cut off score for diagnosis of autism is 30. Scores from 30 to 37 are categorized as mildly- moderately autistic and scores above 37 are categorized as severely autistic.[15]

The main goals when treating children with autism are to lessen associated deficits and to increase quality of life and functional independence. Intensive, sustained special education programs and behavior therapy early in life can help children acquire self care, social and job skills[16] and often improve and decreasing symptoms and maladaptive behaviors.[17] Available approaches include cognitive behavior therapy (CBT) - applied behavior analysis (ABA), developmental models, structured teaching, speech and language therapy, social skill therapy, occupational therapy, physical therapy, sensory integration therapy, audio visual therapy etc.A person with ASD may respond atypically to medications like antidepressants, stimulants and

antipsychotics, the medications may have adverse effects.[16]

Various studies had been done on effectiveness of various combine therapies in treatment of ASD, among which many scientific studies on vision training have produced favorable results.[16,17]The importance and effects of multimodal therapy especially sensory integration therapy and cognitive behavioral therapy are still not comprehensible and need to be studied. So here the study is undertaken to determine the effects of sensory integration therapy (SIT) to come out from their behavior patterns and sensory issues, related to ASD.This study aims to find the combined effects of sensory integration therapy and cognitive behavioral therapy in children with ASD.

METHODOLOGY

An Experimental study was carried out to know the effects of sensory integration therapy and cognitive behavioral therapy in children with ASD. The study was carried out in the Pediatric physiotherapy unit ofa physiotherapy college in Karnataka.Ethical clearance was obtained from institutional review board. 20 children with ASD of mild to moderate category (CARS between 30 and 37) were included in the study. Both male and female children in the age between 3 and 5 years were included after obtaining informed consent from their parents or primary care givers.Children with any kind of physical disability or any other neurological disorder were excluded.

The children were randomly assigned into control group A(cognitive behavior therapy-CBT) and experimental group B (combined therapy of sensory integration therapy -SIT and cognitive behavior therapy-CBT). All the necessary information about ASD and purpose and procedure of the study were explained to the parents or care givers. The baseline data were obtained from both the groups using Childhood Autism Rating Scale (CARS).

The children of group A were treated with CBT which include self care, social interaction, social skill training, and attention and co-ordination improvement activities. (performed with the help of parents / care givers).

- Self care therapy is useful to improve self esteem, which includes mainly tooth brushing, bathing, dressing, toilet training, eating, hand washing.
- Social interaction skills therapy of varying levels is useful to make them socially compatible with social norms. There are developed or learned techniques to build social interaction skills ranging from basic skills (such as making eye contact) to complex and subtle skills (like asking for his or her body parts, daily used instrument, asking for his or her favorite fruit, vegetable etc.). It involves group activities, games and conversation. Also teach them how to use particular objects and subsequently instructed in the related social skills. The effective use of picture cards, video tapes, play groups and peer mentors can considerably help the child to develop social skill. Child specific social skills interventions frequently include, general instructions to increase knowledge and develop social problem solving skills.
- At all the time child's behavior is reinforced with a reward when he or she performs each of the steps correctly. Undesirable behaviors, or those that interfere with learning and social skills, are watched closely.
- Depending upon the level of child's skills, activities that improve attention and coordination, are putting objects from one container to another container, drawing (draw and color), outdoor play, cycling, catching and throwing a ball, folding and cutting a piece of paper etc.

Children of group A were treated by above therapies at 1 hour per day and 5 days per week. Parents or care givers were also instructed to do the same at home.

The children of group B were treated with the above mentioned plan and additionally with the sensory integration therapy; total duration of both therapies were 1 hour per day and 5 days per week. The sensory integration therapy include, scrubbing the whole body with different textures (tactile), vestibular input on bolster and therapy ball, trampoline, balance board (vestibular), pushing the therapy ball, stand on one leg, jump, joint approximation, bouncing on therapy ball, slow vibrator, deep pressure and modulation through therapy ball and bolster (proprioception). Parents and care givers of this group also instructed to do the same at home.

The total duration of treatment for both the groups was 6 months and the children were then reassessed by using Childhood Autism Rating Scale (CARS), to know the effectiveness of the therapy.

DATA ANALYSIS AND RESULT

All the statistical analysis was done by using SPSS 17 for windows software. Intra group comparison for CARS was done by using Wilcoxon Signed Rank test.Descriptive analysis for both groups was also done. The CARS was analyzed with mean value before and after intervention.The inter group comparison for CARS was analyzed by using Mann Whiteny U test to check the homogeneity and treatment effect between two groups.

The table-1 shows gender distribution of both Group A and Group B. In Group A, there were 5 males and 5females and Group B there were 7males and 3 females. It shows mean, standard deviation and range of age for Group A and Group B.

Table-2 shows the intergroup comparison at baseline by Mann Whitney U test. The mean for group A and B is 34.95 and 35.25 respectively. The z value is 0.459 and p value is 0.646 which shows that there is no significant difference between the pre treatment. It proves the pre treatment homogeneity.

Table-3 shows intra group comparison for both the groupswhich has been done by using Wicoxon signed Rank test. The z value for group A is 2.825 and p value = 0.005.For group B the z value is 2.829 with p value equal to 0.004. Pvalues for both groups were significant which indicates that CBT alone and SIT+CBT were effective in ASD.

Table-4 shows the post intergroup comparison of CARS score. The mean for group A and B is 9.9 and 9.8 respectively. The z value is 0.539 and p value is 0.590 which shows that there is no significant difference between groups after treatment.It proves CBT alone and SIT+CBT were equally effective in ASD.

DISCUSSION

The purpose of this study was to find out the effectiveness of combined therapies of Sensory Integration Therapy (SIT) and Cognitive Behavior Therapy (CBT) in children with ASD. The implication of this study may justify the efficacy of sensory integration therapy in the treatment ASD. The groups were synchronized with age and pre treatment scores of CARS (p=0.646). All the participants were treated with standardized intervention program. Beneficial effects significantly found in both the groups in the form of improvement in the symptoms of ASD.

Autism Spectrum Disorder is a highly variable neurodevelopmental disorder[(1)] which is characterized by impaired social interaction and communication, and by restricted and repetitive behavior.[(6)] It first appears during infancy or childhood, and generally follows a steady course without remission.[(7)] To answer the question of optimal type and frequency of exercises, head to

head comparisons in which participants are randomly assigned to receive different exercises are highly needed. There was numerous theories proposed effectiveness of various interventions in the treatment of ASD.[16]

Various evidences are supporting to the cognitive behavior therapy (Randye J. Demple et al. and Rogers SJ et al)[17,18]and also to the sensory integration therapy(Watling R.et al)[19] In this study, one group was treated with cognitive behavior therapy and other group was treated with combined therapies of sensory integration therapy and cognitive behavior therapy. Total six months of treatment was given in both the groups. There was an almost equal improvement of scores found in the Childhood Autism Rating Scale (CARS) in both the groups. The result of this study led to the inference that both cognitive behavior therapy and sensory integration therapy are effective in improving the symptoms of ASD. Numerous studies have come up with effectiveness of only cognitive behavior therapy as well as only sensory integration therapy in the treatment of ASD.[16, 18, 19]

Analysis was done with the base line data and post treatment scores. There was significant improvement in both the groups after six months of treatment sessions with cognitive behavior therapy alone as well as combined therapies of sensory integration therapy and cognitive behavior therapy. There will be no statistically significant difference in the effect of combined sensory integration therapy and cognitive behavioral therapy in ASD. The clinical findings and analysis showed that cognitive behavior therapy alone and combined therapies of sensory integration therapy and cognitive behavior therapy, both were effective in improving the symptoms of ASD.

This study was limited in the age group from 3 to 5 years. The sample size used for the study was small, Long term effects of treatment were not assessed and child co-operation during treatment sessions was vary.

The results of this study may be applied to a large population having different age groups and gender with diagnosis of ASD. The predominance of male child in this study reflects the characteristics of the population that is likely to experience ASD. Further studies can be conducted with randomized control trial for the effectiveness of combined therapies of sensory integration therapy and cognitive behavior therapy in the children with ASD.

This study did not include home based therapies, though repetitions of the same therapy at home may be more effective. The long term effects can be evaluated with these treatments in ASD and also further study can be conducted with diet prescription, environmental change, pet therapy, home based interventions and parental training.In conclusion, this experimental study provided evidence to support the effectiveness of sensory integration therapy in the management of ASD. Further studies could focus on the relative effectiveness of these treatment regimens compared with other approaches.

CONCLUSION

This study concludes that cognitive behavior therapy alone is as well effective as combined therapies of sensory integration therapy and cognitive behavior therapy in decreasing the symptom severity and maladaptive behaviors in ASD.

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Ethical Clearance

This study was approved by Institutional Ethical Committee of Alva's College of Physiotherapy, Moodbidri affiliated to Rajiv Gandhi University of Health sciences, Bangalore, Karnataka.

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Table 1: Gender and age distribution of subjects

Groups	Gender		Age	
	Males	Females	Range	Mean±SD
Group A	5	5	3-5	3.78 ± 0.63
Group B	7	3	3-5	3.75 ± 0.63

Table 2: Pre treatment group comparison of CARS score

Group	Mean	SD	z Value	p Value
CBT	34.95	1.55	0.459	0.646
SIT+CBT	35.25	1.49		

Table 3: Intra group comparison of two therapies

Therapy		Mean	SD	z Value	p Value
CBT	Pre	34.95	1.55	2.825	0.005
	Post	32.75	1.90		
SIT+CBT	Pre	35.25	1.49	2.829	0.004
	Post	33.15	1.98		

Table 4: Post treatment group comparison of CARS score

Group	Mean	SD	Z Value	P-Value
CBT	32.75	1.90	0.539	0.590
SIT+CBT	33.15	1.98		