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A Case Study of Down'sSyndrome Comorbid with Autism Spectrum Disorder: Imitation Skills

Rehana Mushtaq and Sarwat Javed
Family Support Program
Rising Sun Institute for Special Children, DHA Campus, Lahore

Abstract

The present study aimed to explore the improvement in Motor Imitation Skills in a child with Down's syndrome Comorbid with autism spectrum disorder through reciprocal imitation training. A four years old child with Down's syndrome comorbid with autism spectrum disorder was taken from Family Support Program at Rising Sun Institute for Special Children in current single case research. The participant was assessed informally (Case History, interviewwith the mother, observation and formally through Childhood Autism Rating Scale II (CARS II) for confirmation of diagnosis. For a single subject, the design was multiple baseline used across behaviors (gesture imitation and object imitation) for the child and mother. Participantsjoined reciprocal imitation training sessions for 5 days a week during baseline for 2 weeks and treatment for 6 weeks. Follow-up and generalization sessions were not conducted due to the child's illness. Vineland Adaptive Behavior Scales 2nd edition (Sparrow, Cicchetti, &Balla, 2005) and Motor imitation scale (MIS) (Stone, (2015)were administered to determine the child's adaptive level for pre and post-treatment of acquired skills. Reciprocal imitation training was utilized in some casesthe improving motor imitation skills. These findings suggest that reciprocal imitation training may be viable training for children with comorbidity of Down's syndrome and Autism Spectrum disorder.

Keywords: Down's Syndrome, Autism Spectrum Disorder, Imitation Skills, reciprocal imitation training.

Introduction

The concern of comorbid Down'ssyndrome and Autism Spectrum Disorder has quite a limited research basis. Individuals with comorbidity ofDown'sSyndrome and Autism Spectrum Disorder have problemswith social communication skills and restrictive and repetitive behaviors whereas peoplewith Autism Spectrum Disorder (ASD) only have social problems. individuals with Down's Syndrome and Autism Spectrum Disorder (DS-ASD) likely lead to long-term problems when proper intervention is not provided (White, Koenig &Scahill, 2010 as cited in Cody Davis, Campbell, & Tyler, 2017).

Individuals with Down's syndrome (DS) have extra chromosomes 21 in all their cells (i.e trisomy 21), chromosomes 21 in some cells (i.e. mosaicism), a portion of chromosomes 21 attaches to the different chromosome (i.e., translocation),or aninnerreplication of some acute genes occurs on one chromosome 21 (Heward 2013). The diagnosis ofDS can be doneby using one of the numerous medical tests;on the other hand,interviews and behavioral observation are essential for the diagnosisof ASD (Cody Davis, Campbell, & Tyler, 2017; Moss, Richards, Nelson & Oliver, 2012).

Imitation is described as aninfluential means of skill attainment, cultural transfer and social interaction (Dautenhahn&Nehaniv, 2002).Children with ASD have significant impairment in imitation skillssymbolic (object use) and non-symbolic (gestures). "Reciprocal imitation training (RIT) is a natural imitation intervention planned to demonstrate the social usage of imitation to young children with ASD duringongoing play interaction with a play partner" (Keoge 1987). Thetechnique aims to demonstratefor a child to imitate the meanings of social interaction andconsequently, it is more essentialthat thechild should challenge tocopy actions than to accomplishsomeparticularaction. RIT can be applied in a diversity of play settingsother than during daily routines. This techniquepracticessome strategies to demonstrate imitation skills (Vivanti, & Hamilton, 2014).

Esposito and Vivanti, (2012); Gowen and Hamilton, (2012); Silver and Rapin, (2012) explored that poor imitation in ASD might be due to motor-associatedtroubles.Wang, Newport, and Hamilton, (2011) suggested that atypical imitation in an individual with ASD might be caused by thefailure of Top-down mechanismindicators or social motivational indicators.

Dual diagnosis of DS-ASD was described as unusual occurring in only about 1 % of the DS population (Moss-Howell, 2009).Moreover, recent studies indicate a higher rate of comorbidity with ASD,like 15.6 % to 37.7 % in the DS population (Lowenthal, Paula, Schwartzman, Brunioni, &Mercadante, 2007; Warner, Moss, Smith &Howlin, 2014). If 37.75 occurrences of ASD in DS suggest approximately 1in 260 individuals with DS also have ASD.

The first published work on Autism Spectrum Disorder in Down's syndrome (DS-ASD) was a case study description in 1976 (Ghaziuddin, 1997). Latterly, few types ofresearch were done on children with DS(Wakabayshi, 1979; Dressler,Perelli, Bozza, &Bargagna, 2011; Hepburn, Philofky, Fidler, & Rogers, 2008; Lober, Suarez, &Atchiston, 2015) and suggested that the occupational therapyshould begiven five times a week for 45 minutes sessions.

Ingersoll and Gergans (2006) indicated that RIT is effective for training imitation skillsboth gestures and objects to young children with ASD in multiple baseline designsthrough behaviors and in a natural setting. Mothers were taught to practice RIT techniques with the child for 10 weeks.These techniques increasefurther social communication behaviors, as well aspretend play languageand joint attention(Ingersoll &Schreibman, 2006).

The literature on Down's syndrome and Autism Spectrum Disorder has been establishedthroughprevalence studies, case study reports and diagnosis consideration. There isa lack of research and numerous methodological concerns/ confirms through empirical results that specialists can integrate into the planning of the intervention (Cody Davis, Campbell, & Tyler, 2017).Furthermore, there is no research onindividuals with DS andASDthat have concentratedespecially on refining motor imitation skills through reciprocal imitation training.Individuals with Down's syndrome and autism spectrum disorder have asimilar lack of imitation as individuals with autism spectrum disorder only. The purpose of the study is to improveintervention in literature for an individual with DS andASD by exploring the intervention and evidence-based methods like reciprocal imitation training and simultaneous prompts.

Case Report

The child was a five years six-month-old boy and he is a known case of down syndrome. He belonged to middle socioeconomic status and lived in the joint family system. He joined a special institute at the age of four years and enrolled for sessions in family support program. The Interdisciplinary team conducted an assessment procedure (medical officer, psychologist, speech and language pathologist physio therapist sensory and occupational therapist) and diagnosed Down syndromewith ASD. His mother reported that he suffered from generalized clonic tonic fits at the age of one and halfyears and was used Epival Syrup three times per day and discontinued the medicine at the age of four years. He also had a history of Pneumonia at the age of one and half years. He had delayed developmental milestones. Patents of the child reported that he has difficulty initiating social interaction and did not engage in age-appropriate play with siblings and peers. As the child improved in all developmental areas after joining the special institute parents agreed to his additional sessionsto avail any chance of improvement in social interaction and age-appropriate play. Parents cooperated well with the researcher according to the treatment.

Method

The present studywas conducted to find out pre and post-improvement in Motor Imitation Skills in a child withDS andASDthrough reciprocal imitation trainingsessionsin a single case study.

Sample:

A 4 years old child withDown's syndrome and autism spectrum disorder was taken from Family Support Program at Rising Sun Institute for Special Children in current single case research and diagnosed by a psychologist according to the diagnostic and statistical manual of mental Disorder (DSM 5) (American Psychiatric Association, 2013) and with help of observation and Childhood Autism Rating Scale, Second Edition (CARS 2).

Measure and material

Vineland Adaptive Behavior Scales 2nd edition (Vineland II) (Sparrow, Cicchetti, &Balla, 2005)was administeredto determine the adaptive level of the child and theMotor imitation scale (MIS) (Stone, (2015) wasused to assesspre and post treatment generalization of acquired skills.

Parent training

Therapy was conducted by the psychologist and mother of the participant. Mother was given reciprocalimitation training for 2 weeks during the baseline period.

Design and procedure

Consent was taken from the parent of the participant. Information from different resources (Case History, observation,parental interview,CARS II, Vine landintegrated for confirmation of the diagnosis. A single subject,multiple baseline design was used across behaviors (gesture and object imitation) for the child and mother. The Participant wastaken reciprocal imitation trainingsessions at family support program 5 days a week during baseline and treatment.The participant received baseline for 2 weeks and 4 weeks for treatment.During treatment, he started to remain absent due to the puss in his gums and temperature. After four weeks'sessions, he was hospitalized due to loose motion. So intervention was terminated due to his illness and hospitalization.

Material and Setting:

All sessions of baseline and treatment were conducted in a small room with a carpeted floor at rising sun institute. The room had a one-way mirror through this mirror video of the treatment was taken. Toys were taken according to the interest of the child as well as recommended by the RIT manual(identical pair of vehicles in two or

three pieces which cannot be manipulatedso the child just focuses on imitation not on parts of toy, stuffed animals, nesting toys, rattles, and miniatures of dogs) throughout the baseline and treatment sessions were used.

Baseline

Baseline sessions werecomprised of free play witha psychologist.Psychologist demonstrated an expressive gesture and verbal indicatorlinked to the child's action. Demonstrated gestures weremodified from explanationsgivenby Acredolo&Goodwyn, 1988; Ingersoll, 2008). Everyact wasdemonstrated up to three times. Trials werecompleted to improve attention by rating by facing the child and saying his name. Noreaction wasgiven to the Child's successive behavior. While the psychologist did notimitateextra interaction with the child, she reacted to any child's initiation with a short, suitablereaction. During the sessions attempts were made to replace inappropriate behavior with alternative behavior (such as throwing the airplane with the taxi on the floor). The psychologist also attempted that sounds provided while imitating behavior do not match with a toy.

Treatment:

The intervention wasmodifiedfrom RITtechniques successful for training object imitation (Ingersoll &Schreibman, 2006). Gesture imitation was taught using a prompting procedure. The psychologist modeled a gesture and responded verbal marker related to the child's play up to three times. When the child imitated the gesture, the psychologist appreciates him and allowed him continued access to the play materials. When the child was notimitating after the third trial, the psychologist wasgivena physical prompt to the child for imitating the gesture and then appreciated it.

The purpose of the RIT is for the child to imitate the most of actions of a play partner rather than to exactly produce specific actions in response to the model (Ingersoll &Schreibman, 2006). The modeled actions were meaningful for the child. Instead of teaching specific actions according to the criteria, many actions weretargeted at the same time based on the context of the child's play.

Generalized and follow-up session:

Ten minutesgeneralization sessions wereplanned toconductat the end of treatment, and a one-monthfollow-up. These sessions were identical to baseline and include new materials, setting, and therapist. These sessions were meant to use to assess the generalization and maintenance of skills in another new environment.

Generalization and follow-upsessions were not conducted due to the child's illness.

Results

It was hypothesized that Motor Imitation Skills improved ina child with Down's syndrome and autism spectrum disorder through reciprocal imitation training.The pre and post-ratings of child performanceof motor imitation skills on selected goals and Motor Imitation Scale (MIS) by psychologist and mother were explained through graphical representation.

Table 1

Rating of Child's Performance on Selected Goals as Observed by Psychologist

Goals	Pre assessment	Baseline	Treatment	Target outcomes
Eye contact to person	1sec	5 Sec	20 sec	50% Achieved
Bang spoon on table	0	0	2	50% Achieved
Hi five	0	0	2	Achieved
Raise hand to be pick	0	1	2	Achieved
Reach to the person	0	0	2	Achieved
Shake hand	0	1	2	Achieved
Shake rattle	1	1	2	Achieved
Clap hands	0	0	1	16% Achieved
Wave hand	0	1	1	35% Achieved
Push car across tabletop	1	2	2	66% Achieved
Pat cheek	1	1	2	66% Achieved
Drum with hands on tabletop	0	1	2	Achieved
Place small block on the head	0	0	0	Unachieved
Hold string of play beads behind neck	0	0	0	Unachieved

Note. 0= fail, 1=emerge, 2=pass and best score out of 3 trials

Table 1 indicated that psychologists report Eye contact to person, bang spoon on table, hi five, raise hand to be pick, reach to the person, shake hand, shake rattle, clap hands, wave hand, push car across tabletop, pat cheek, drum with hands on tabletop were improved as motor imitation skills through reciprocal imitation training.

Figure 1

Child's Performance on Selected Goals as Observed by Psychologist

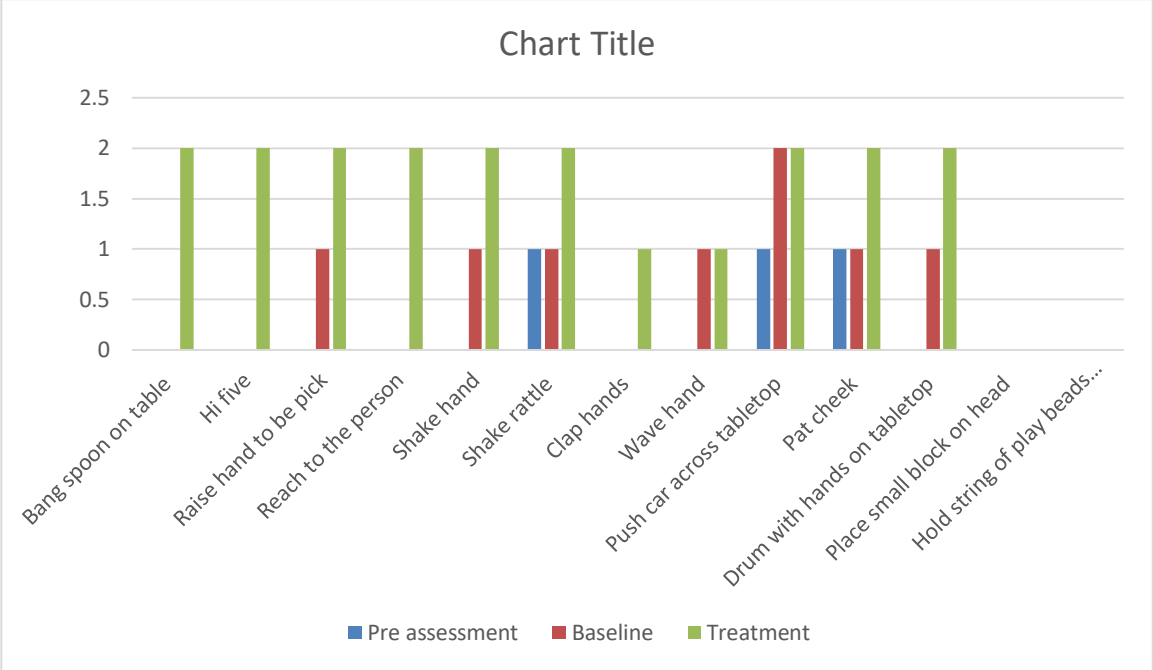

Figure 2 shows improvement in motor imitation skills selected goals after reciprocal imitation training reported bypsychologist.

Table 2

Rating of Child's Performance on Selected Goals as Observed by Mother

Goals	Pre assessment	Baseline	Treatment	Target outcomes
Eye contact to person	5 seconds	7 seconds	40 seconds	Achieved
Bang spoon on table	0	1	2	35% Achieved
Hi five	0	1	2	Achieved
Raise hand to be pick	1	1	2	Achieved
Reach to the person	1	1	2	Achieved
Shake hand	0	1	2	Achieved
Shake rattle	1 out of 3 trials	1	2	Achieved
Clap hands	0	1	1	16% Achieved
Wave hand	0	0	1	16% Achieved
Push car across tabletop	1 out of 3 trials	1	2	66% Achieved
Pat cheek	1 out of 3 trials	1	2	Achieved
Drum with hands on tabletop	0	0	2	Achieved
Place small block on head	0	0	0	Unachieved
Hold string of play beads behind neck	0	0	0	Unachieved

Note. 0= fail, 1=emerge, 2=pass and best score out of 3 trials.

Table 2 indicated that mother report Eye contact to person, bang spoon on table, hi five, raise hand to be pick, reach to the person, shake hand, shake rattle, clap hands, wave hand, push car across tabletop, pat cheek, drum with hands on tabletop were improved as motor imitation skills through reciprocal imitation training.

Figure 2
Child's Performance on Selected Goals as Observed by Mother

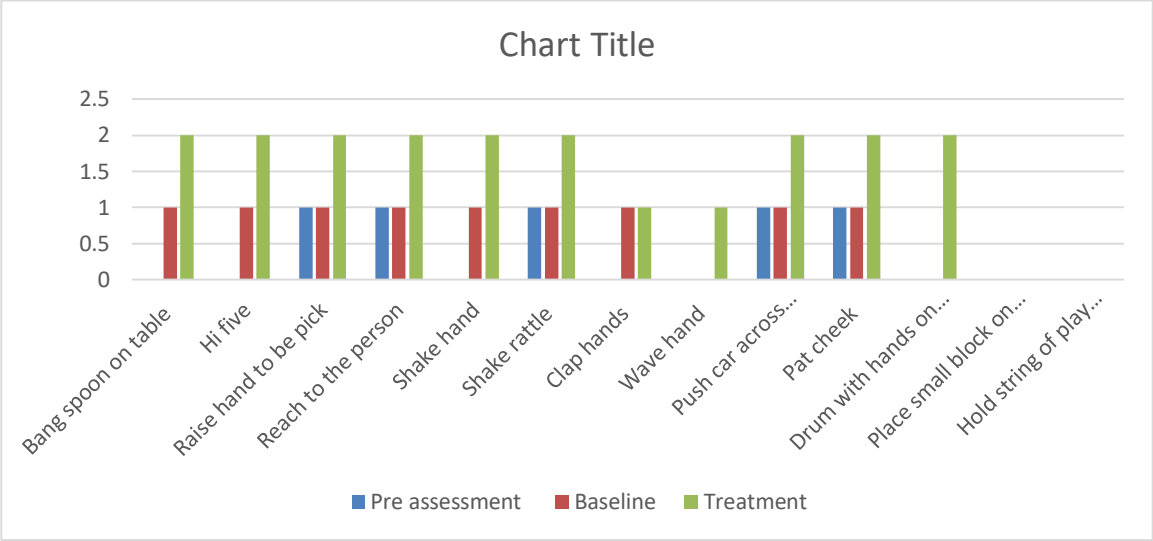

Figure 2 shows improvement in motor imitation skills selected goals after reciprocal imitation training reported by mother.

Table 3
Rating of Child on Motor Imitation Scale Reported by Therapist and Mother

	Pre-assessment	Baseline	Treatment
Mother	3	6	11
Therapist	3	6	12

Table 3 indicated that the psychologist and mother reported in the score of motor imitation scere improved as motor imitation skills through reciprocal imitation training.

Figure 3
Motor Imitation Scale Reported by Therapist and Mother

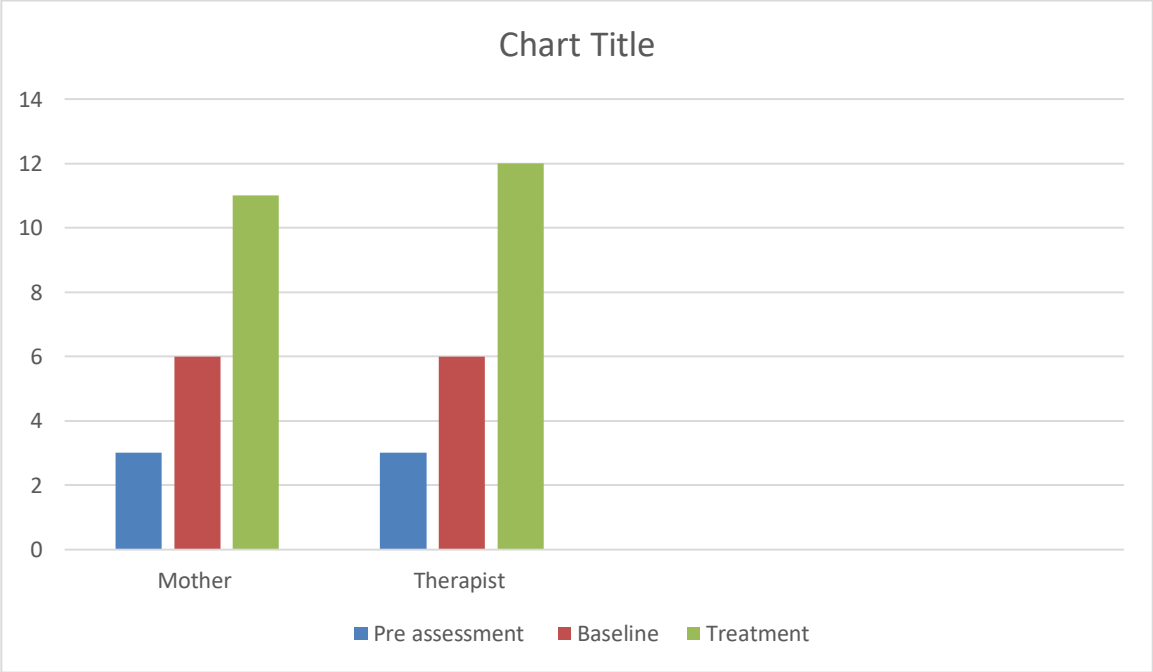

Figure 3 indicates the improvement in the score the of motor imitation scale after reciprocal imitation training.

Hence the results indicated that motor imitation skills were improved through reciprocal imitation training.

Discussion

In this case,those imitation factors that are linked with autism spectrum disorder were discussed. The reciprocal imitation training sessions were given baseline for 2 weeks and 4 weeks for treatment 5 days in a week after in-depth assessment and found a discrepancy between his level of chronological and functional age through a single case study design. It also highlights the reasons behind his behaviors. This case carried the importance of reciprocal training for the imitation skills of the child with ASD. When children have Downs syndrome, they were able to learn through imitation.

With the comorbidity of ASD and Downs syndrome, this skill was improved through training(Ingersoll &Schreibman, 2006). Wainer and Ingersoll (2013) explained the improvement in child imitation through reciprocal imitation training. In this case study, the imitation was improved through reciprocal imitation training which is consistent with the previous literature (Krupicz, 2014; Penney & Schwartz, 2018; Taylor, 2014; Wainer& Ingersoll, 2010). Cardon and Wilcox (2011) explorethe improvement in pre and post-assessment of MIS scores through RIT in children with ASD. Walton and Ingersoll (2012) explain the effectiveness of RIT on imitation skills in children with ASD.

Conclusion

Reciprocal imitation training plays an important role in imitating the child with ASD. This research provides empirical evidence that reciprocal imitation training improves imitation skills in children with Down's Syndrome comorbid with Autism Spectrum Disorder.

This research was a single case study. In the future, intervention should be implemented in more cases for further empirical evidence. The child was taken from one institute in this research. An intervention study should be done in the future.

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