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Effect of alternative and augmentative communication on language and social behavior of children with autism

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Teaching children with autism is a challenging task for educators and parents, as the children display marked deficits in language and social behaviors. One of the major goals of an intervention program for children with autism is to provide them a method of functional communication and ample opportunities to practice these skills. For some children with autism, a communication system that uses alternative and augmentative forms of expression may be necessary. Children with autism (N = 8) between the ages of 9 and 12 years were selected from special schools in Mumbai for this experimental research. The study aimed to determine the effectiveness of Makaton Vocabulary Language Program, a system of alternative and augmentative communication (AAC), on development of language and social behavior of children with autism. The subjects received 12 sessions of language intervention using AAC. Language assessment tool for autistic children (LATCA) and social behavior rating scale (SBRS) were used as instruments for measurement. While the researcher administered LATCA, the classroom teachers used the SBRS as a checklist for social behavior. The comparison of their pre and post test mean scores showed a significant change in language and social behavior. Use of AAC had a positive effect on development of receptive and expressive language. AAC usage was also found effective in enhancing social behavior of children with autism.

Key Words: Autism, AAC, language and social behavior, makaton vocabulary language programme.

INTRODUCTION

Autism is a developmental disorder that affects a child's perception of the world and how the child learns from his or her experiences. Even among the most complex disabilities, autism remains an enigma. Autism is the frequently occurring form of a group of disorders known as autism spectrum disorders (ASD). The Autism Society of America (2006) defines autism as a complex developmental disability that typically appears during the first three years of life and is the result of a neurological disorder that affects the normal functioning of the brain, impacting development in the areas of social interaction and communication skills. Both children and adults typically show difficulties in verbal and non-verbal communication, social interactions, and leisure or play activities. One should keep in mind however, that autism is a spectrum disorder and it affects each individual differently and at varying degrees. Autism affects essential human behaviors such as social interaction, ability to communicate ideas and feelings, imagination,

and establishment of relationships with others (National Research Council, 2002). While children with autism display a range of behavioral deficits, the delay in the development of language and communication and social interactive abilities is central to the problem. Research over the past few years has identified core deficiencies that affect the development of communication and social behaviors in children with autism. They are in the areas of joint attention and symbol use (Dawson, et al., 1990; Sigman and Ruskin 1999; Wetherby et al. 1998; Ogletree 2008).Joint attention deficit reflects difficulty in coordinating attention between people and objects, and is evident in orienting and attending to a social partner; shifting gaze between people and objects; sharing emotions and feelings with another person, and being able to draw another person's attention to objects or events for the purpose of sharing experiences. Symbol use reflects difficulty in learning conversational or shared meanings for symbols and is evident in deficits in using conventional gestures, learning

conventional meanings for words, and using objects functionally and in symbolic play. Joint attention has been found to be a significant predictor of language development in children with autism (Mundy et al, 1990). Such children also show a limited gestural use, and predominantly use motoric gestures to communicate, such as leading, pulling or manipulating another's hand. They lack conventional gestures (e.g. showing, waving, pointing) and symbolic gestures that depict actions (Stone and Caro-Martinez, 1990; Stone et al, 1997). Limited ability for symbolic or pretend play contributes to the delay in development of receptive and expressive language in children with autism (Sigman and Ruskin 1999). Over the years, development of language and communication skills has become the core of autism intervention efforts. Several methods and strategies have been used. Among such methods are Augmentative and Alternative Communication (AAC) systems. AAC is defined as an area of clinical practice that attempts to compensate (either temporarily or permanently) for the impairment and disability patterns of individuals with severe expressive communication disorders (that is the severely speech-language and writing impaired).

AAC incorporates the individual's full communication abilities (American Speech-Language-Hearing Association 2006). AAC may support existing speech or develop inde-pendent use of sign language, visual symbols (picture and words), and voice output devices. For children with autism who do not acquire functional speech or have difficulty in processing and comprehending spoken language, AAC can be a useful tool in educational program (National Research Council 2002). The useful-ness of AAC for individuals with impairment and multiple disabilities have been documented in a large number of research studies in the Western countries (Bricker, 1972; Kiernan and Reid, 1979; Rush 1996; Grove, 1997; Koul and Harding, 1998). In India, the use of AAC is relatively new. AAC usage was found effective in developing language in Indian children with severe and moderate mental retardation (Lal, 1999; 2006). AAC includes the use of visual language systems such as signs, pictures and visual icons representing specific communication units. These capitalize on strong visual processing of many autistic children. Visual supports are reported to be useful in educational program for children with autism who do not acquire functional speech or have difficulty in processing and comprehending spoken language and social communication (Lal, 2005, Lal and Bali, 2008). The visual information, which is predictable, static or less dynamic than words, enables the child with autism to improve recognition of language input or generation of language output. AAC provides a simple way to commu-nicate needs and may reduce challenging behavior events that hamper social interactive abilities (Hodgedon 2000). Makaton Vocabulary Language Program, a system of AAC, was used as an instrument of intervention in the study. Makaton is a multimodal system that encourages functional communication and socially

interactive behavior in individuals with communication and language difficulties. The Program consists of an open - ended lexicon, based around a common core of functional concepts, which is taught with manual signs and /or graphic symbols accompanied by speech. The principles that govern the design of the Makaton Vocabulary program are derived from the belief that effective use of any communication depends on its consistent use in significant environments (Walker, 1987; Grove and Walker, 1990). The Makaton Vocabulary is presented in 8 graded stages. Originally from U.K., Makaton has been adapted in many countries around the world including India. The core vocabulary includes a combination of nouns, verbs, and descriptive words. While the initial stages comprise of words or language concepts that are within the child's immediate environment (e.g. food, furniture, people, animals, toys along with relevant verbs and adjectives) the later stages have concepts pertaining to relationships, religion and abstract ideas. The Makaton Vocabulary - Indian Version (Walker, Ghate and Lal, 1992) mainly comprises of words that are commonly used in India. The words have been matched with signs from the Indian sign language.

The graphic symbols represent the words in the manner that is culturally appropriate to India. Researches on Makaton document its effectiveness for development of communication skills in children and adults with intellectual disabilities (Lal, 2001, 2006; Grove and Walker 1990). This study sought to establish the appropriateness of AAC intervention for children with autism. Hence, the research aimed to study the effectiveness of AAC training on development of language and to determine the effect of AAC training on development of social communicative behavior in children with autism.

MATERIALS AND METHODS

The study employed the one - group - pretest - posttest experimental design and was conducted on children with autism enrolled in special schools in Mumbai.

Subjects

Children with autism within the age range of 9 to 12 years were selected. This selection was made from an available group of 19 children from special schools in north Mumbai. The selection criterion eliminated:

(a) Children who had previous exposure to AAC or similar speech and language intervention and
(b) Children who were found to function below age 3 years on Language Assessment Tool (Rao, 1992) in the area of language and communication.

A group of 8 children, who met the requirements, was selected. As per the school records the subjects also had intellectual disabilities.

Material

Language assessment test for children with autism (LATCA) and

Table 1. LATCA words from stages 1-3 of the makaton vocabulary.

Words from Stage 1	Words from Stage 2	Words from Stage 3
Food	Water	Apple
Biscuit	Milk	Mango
Cup	TV	Banana
Toilet	Telephone	Boat
House	Fan	To walk
Table	Ball	To run
Bed	Bat	Big
To sleep	Cat	Small
To drink	Dog	
To eat	Clean	
To wash	Dirty	

social behavior rating scale (SBRS) were developed by the author for assessing the language and social skills of the subjects. The instruments were individually administered at pre and post test levels.

LATCA

The instrument tested the subjects on receptive and expressive language tasks. It consisted of 2 parts. Part 1 focused on receptive language, and required a subject to identify pictures/objects of daily use when presented with a distracter. Part 2 tested acquisition of expressive language abilities, and required a subject to sign/name the given pictures/objects. LATCA included level appropriate and functionally useful words selected from the first three stages of the core vocabulary of Makaton Vocabulary-Indian Version. Since the core vocabulary has a combination of nouns, verbs and descriptive words, LATCA used a similar combination. From over 150 language concepts in the first 3 stages of Makaton Vocabulary (Indian Version), only 30 words were selected (Ref Table 1). This exclusion was deliberate, and was done in order to emphasize the learning of key words that are related to basic needs and relevant to child's immediate environment. Besides, the selection of words was premised on what generally constitutes the early language development program followed in pre-primary and primary classes of special schools for children with developmental disabilities in Mumbai. Out of the 30 LATCA words, eleven were from Stage 1; eleven from Stage 2, and the remaining were from Stage 3. For assessment of receptive language, the stimulus picture card/object along with two matching distracters was presented. A correct identification of stimulus card/object earned a score of 1 point. Thus, the maximum attainable score in Part 1 was 30. Assessment of expressive language was done the basis of child's ability to label the word verbally or through manual signs. Either verbal or manual expression earned a score of 1 point, but 2 points were scored when a child used both modes of expression correctly. Hence, the maximum score was 60 in Part 2, and the total attainable score on LATCA was 90.

SBRS

This instrument assessed the social communicative behavior of the subjects. It comprised of a list of behaviors that reflect communication intent and social interaction e.g. eye contact, joint attention, imitation, social response, sharing, expression of personal needs, play and greetings etc. (Partington and Sundberg, 1998; Linder, 1993). The selection of items (12) was done on the basis of

observed social behaviors of same age children with developmental delays (Table 2). The behaviors were assessed on a 5-point scale (Always - Mostly - Frequently - Rarely - Never) depending on their intensity. Hence, a behavior always evident scored 5 points and that not in evidence was allotted 1 point. SBRS was an observational tool with maximum obtainable score of 60. Observations were done by the author and the classroom teachers of the children. These observations were done pre and post treatment.

Treatment

Intervention was given through twelve sessions. Each session began with readiness exercises such as intrusion play (e.g. tickling, tapping, touching so as to arouse the child) and imitation (e.g. researcher touching own head and saying 'head' and placing the child's hand on his/her head and saying 'head' again to promote association of body part with gesture and auditory symbol). Makaton was used to teach the language concepts. Pictures and objects were used for teaching the words. The treatment was structured as given below.

Step 1: Pictures/objects (2or3) shown and named along with their manual signs.
Step 2: Child was asked to point to a picture/object with a distracter.
Step 3: Child was asked to label a presented picture/object verbally or through manual sign
Step 4: All responses were reinforced systematically and prompted if required.

To illustrate, a typical session with Anil, a 9 year old boy, comprised of the intrusion exercise to be followed with language learning activity. Two or three words were introduced in a session. For example 'Cup' was introduced with 'House' and 'Biscuit'. The instruction would be 'Anil, look - Cup' (with signs for 'look' and 'cup'). The researcher would say and sign 'cup' simultaneously. Once this was done for all the three words, the child was presented with all three cards/objects and asked 'Anil, where is cup?' Here again the key words 'where' and 'cup' were signed. This step checked if he was able to link the sign with the word. Finally the child was taught expression. When the cup was presented, Anil was asked 'What is this? He was encouraged to respond either verbally or in sign. Both verbal and manual responses were reinforced and physical prompts were also provided for shaping signs. The sessions included indirect teaching of words (e.g. 'what', 'where', 'here', 'give', 'show', 'good' 'I' 'me' 'you' etc.) that were not assessed on LATCA, but enhanced social interaction. Each child was given treatment for twelve sessions. This was

Table 2. Items in SBRS.

Items	Behavior	Always seen	Mostly seen	Frequently seen	Rarely seen	Never seen
1	Gives eye contact when name is called					
2	Smiles at familiar adults					
3	Reaches for offered objects					
4	Draws attention of attention of another person to show object/action					
5	Imitates gestures/actions					
6	Indicates toilet needs					
7	Shares food/toys when requested					
8	Requests for desired items					
9	Follows rules of familiar social settings					
10	Engages in a) Solitary play , b) Parallel play , c) Group play					
11	Waves bye-bye					
12	Greets others					

Table 3. Pre and post test scores on LATCA.

Subjects	Pretest score	Posttest score
1	9	26
2	7	32
3	10	37
4	15	30
5	9	19
6	8	17
7	6	18
8	12	34
N = 8	76	213

followed by post tests on LATCA and SBRS. Class teachers were also required to observe the children on SBRS. This was in addition to the SBRS observations made by the author.

RESULTS

As the sample size was small (n = 8) and selection of subject was from an available group of children with autism, the data was analyzed using a nonparametric technique.

Development of language and communication

The first objective of the study was to determine the effectiveness of AAC training on development of language and communication skills in children with autism. Data was analyzed by using non - parametric statistics. The Wilcoxon Signed Ranked Test calculates the magnitude of difference between pre and post test scores, and the direction of this difference. The absolute values

of the difference are ranked. The sum of positive and negative difference is calculated. The lower value is W, the Wilcoxon Value. The obtained value of W should be equal or less than the critical value of W for rejection of null hypothesis. All children improved their score on LATCA from pre to post treatment (Table 3). The group's composite LATCA scores on receptive and expressive language, at pre and post tests, were compared on Wilcoxon. The obtained W value (W = 0) was significant (W critical value =1, p <.01, n = 8). In order to ascertain if AAC training has been effective across receptive and expressive language, the scores on both Part 1 and 2 were analyzed. The comparison of pre and post test scores on receptive language (Part 1) showed significant gain (W = 0, p < .01, n = 8) in this area. Significant outcome was also found when expressive language scores were compared (W = 1, p < .01, n = 8). This led to the rejection of the null hypothesis 'Training in AAC will have no effect on development of language and communication in children with autism'. Figure 1 provides a graphic comparison of scores on LATCA.

Table 4. Pre and post test scores on SBRS.

Subjects	Pre-test score	Post-test score
1	20	25
2	18	22
3	25	36
4	30	38
5	18	23
6	17	20
7	16	20
8	32	40
N = 8	176	224

Social behavior

The second objective of the study was to determine the effect of AAC training on developing social behavior in children with autism. The author observed the children on SBRS within and outside classroom for assessment of social behavior. All children improved their score from pre to post test (Table 4). Class teachers also rated them on SBRS. Data obtained through author observation was correlated positively to that of the class teachers (r = 0.78).

Analysis of data showed the difference between pre and post test scores to be statistically significant (W = 0, p<.01, n = 8) and led to the rejection of the null hypothesis 'AAC training will have no significant effect on the social communicative behavior of children with autism'. It indicated the value of AAC training in enhancing social communicative behavior (Figure 2).

DISCUSSION

Development of language and communication

For children with autism who have severe speech and language delay, the overriding goal of intervention should be to increase their functional communication. Functional communication can be promoted by (i) selecting words/ forms concepts functionally relevant to the child's environment (ii) teaching the child to use the words/forms in functional manner and (iii) preparing people in the environment to respond to words/forms used by the child in functional manner (Lal,1999). Given the importance communication has as a prognostic indicator of future social and educational development and later quality of life, it is imperative that intervention program for children with autism stress on alternative means of communication for those who have deficits in receptive and expressive language. These alternatives means consisting of visual icons, symbols and manual signs, capitalize on strong visual processing ability in many children with autism (Lal and Bali 2008, Malandraki and Okalidou 2007). Makaton addressed the children's

immediate communication needs and facilitated pragmatic use of acquired language skills. Several studies have demonstrated that total communication (combined use of speech, signs and/or symbols) training results in faster and acquisition of receptive and expressive vocabulary than speech training alone for many children with autism (Goldstein, 1999; Yoder and Layton 1988; Layton, 1988; Seal and Bonvillian 1997; Lal, 2005). Children with autism prefer decoding items visuo - spatially, and are better at processing visuo - motor - kinesthetic informa-tion (Earles - Vollrath, et al. 2008). Therefore, using combined mode of speech and signs appears to be of benefit. The significant difference between the children's pre and post test scores on language and communication may be attributed to these factors. Use of sign language along with speech has been accepted as an affective - expressive AAC option for persons with autism (Ogletree 2008).

Social behavior

Social interaction is closely related to language and communication. For autistic children language should not be viewed as a goal in itself, but as a means to under-stand and participate in social interactions. What is taught in language program must be functional and relevant to life (Thiemann and Kamps, 2008). Comprehension of communication and language is a developmental process that continues into early adulthood. The features are (i) context assisted comprehension of emergent symbolic communication (e.g. comprehension aided by gestures, signs, vocal tone, vocal stress etc.), (ii) comprehension of word order and (iii) comprehension of higher order lan-guage content, form and use (Ogletree 2008). Makaton Program is based on the premise that commu-nication occurs in interactive, interpersonal context, and that attempts to develop communication should take this into account (Walker, 1991). The goal is to develop functional use of speech and manual signs within the framework of a conversational exchange (Lal, 2006). Use of signs with speech, during treatment, improved comprehension. As children began to link signs with pictures/words they

actively participated in the teaching sessions. This was observed by the author during the 6th session. Emergence of pivotal responses for social behavior such as eye contact, joint attention, pointing and smiling etc. was noted by their class teachers. AAC training facilitated social participation. The statistically significant difference between the SBRS pre and post tests scores indicates the positive effect of AAC training on development of social behavior. Though this study has underscored the significance of AAC training and usage in development of language and communication, and social behavior of eight autistic children, similar studies with larger samples will help generalization of the findings to the target population of children with autism.

Conclusion

For children, education must foster acquisition of not only academic skills, but also language and communication, socialization and adaptive behavior. Practices in education of young children with autism emphasize need based use of AAC strategies to facilitate communication and social participation. The results of this study conform to above findings. AAC training and usage were effective in enhancing language and communication and social behavior of children with autism.

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