

Home based ABA and TEACCH intervention for child with autistic disorder

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The pioneering research of Lovaas (1987) on early intensive intervention for children with autism employed home-based model. The important feature of this programme was that the initial work with the child was delivered in the home. Most of the home-based programmes operate in an ABA and TEACCH framework. Goal of the study is to implement ABA and TEACCH based training for mother of a child with autism and later to implement on the child by the mother and to evaluate the benefits of the training programme for the child. Case history: Master GH, aged 4 year, male had no schooling, hailing from middle socio economic status, came with symptoms of lack of eye contact, aloofness, injuring himself, repetitive motor behaviours, hyperactivity, speech not developed and poor comprehension of both verbal and gestures. The following tests were administered to the child: CARS, VSMS, REELS and Denver Developmental Screening to assess severity of behaviour problems, motor developments, cognitive and social skills of the child. The format of the home based behavioural training for mother consisted of 20 by-weekly sessions for 2 ½ months. Mother was explained about autism, behavioural problems, communication problems and difficulty in socialization. ABA and TEACCH based parental training was implemented, which included managing problem behaviours by explaining reinforcement, extinction, time out and developing new behaviours through prompting and shaping. Further, mother was trained in communication skills through verbal and non-verbal modes. In addition socialization techniques were also taught. Mother of the child carried out the home based training for 9 months. Above test were administered again at the completion of the programme by the mother to assess the improvement gained by the child. The home based management carried out by the mother brought out significant improvement in motor skills, daily routine, mild to moderate improvement in behavior problems, improvement in communication skills and social skills.

Keywords: home based behavioural intervention for autism, aba and teacch intervention, evaluation of outcome

Autism is the core disorder of the pervasive developmental disorders (PDD) as defined by (ICD-10, WHO 1993) and the Diagnostic and Statistical Manual of Mental Disorders (DSM IVTR, APA 2000). Autism is a spectrum along which children experience varying degrees of difficulty in the areas of communication, social interaction and repetitive behaviour. These children frequently pose considerable behavioural challenges to their parents and to other family members. The pioneering research of Lovaas (1987) is home-based behavioural intervention for children with autism. It is an early intensive intervention for children with autism employed home-based model. The important feature of this programme is that the initial work with the child was delivered in the home. Most of the home-based programmes operate in an ABA and TEACCH framework.

The ABA program is home-based, intensive intervention program that relies on one on- one instruction of attending, imitation, receptive and expressive language, pre-academics and self-help based on the work of Lovaas (1987). Applied Behaviour Analysis is based on more than 50 years of scientific research and evolved continually as new evidence emerges (Maurce, 1996). Early intervention has taken a wide range of formats, some including parents as a co-therapist (Sambandam & Rangaswami, 2011). Programmes vary considerably in their theoretical background (Prizant & Wetherby, 1998). Some approaches utilize applied behaviour analysis (ABA) in intensive programmes based at home, involving parents but delivered primarily by trained therapists (McEachin, Smith, & Lovaas, 1993). This approach uses a 'discrete trial' training format for accurate control over children's learning.

Other approaches have an educational framework such as project TEACCH (Treatment and Education of Autistic and related Communication handicapped Children) with emphasis on structuring class environments through visual cueing, communication routines and individual tasks (Lord & Schopler, 1994). The TEACCH program aims to increase children's independence and is designed to work on existing strengths that children may have rather than focusing on weaknesses (Diggle & McConachie, (2009).

Parents of children who have autistic spectrum disorder play an important role in the management of children. The involvement of parents in implementing intervention strategies designed to help their autistic children has a history stretching back at least three decades (Schopler & Reichler, 1971). The potential benefits are increasing skills and reducing stress for parents as well as for children. Training parents in new skills has frequently been carried out in groups, allowing for mutual support. Increased parental skills allow for continual opportunities for learning in a range of situations. Training parents of children with autism as 'therapists' allows intervention to begin early to involve consistent handling and ensures that intervention is appropriate in enhancing children's earliest social relationships, communication and reducing negative behaviours.

Within the autism intervention literature, there are a number of individual studies which evaluate specific parent-mediated early intervention approaches in dealing with behaviour problems (Howlin et al., 1987), in improving parent-child interactions (Dawson & Osterling 1997; Koegel et al., 1996), in facilitating communication (Prizant et al., 1997) and in implementing a behaviour analytic approach (Smith, Groen, & Wynn, 2000). In addition, there are evaluations of the added value of parent involvement to a day-care or nursery programme (Jocelyn et al., 1998). Diggle and McConachie (2009) suggested that these studies

need to be collated and summarized in a systematic way in order to evaluate the strength of evidence concerning parent-mediated early intervention for young children who have autistic spectrum disorder.

Aim of the study

The aim of the study was to implement home based ABA and TEACCH intensive intervention programme. Mother of autistic child was trained in home based. Trained mother of the child implemented behavioural intervention programme for reducing behaviour problems and increasing skills of the child and to find out the benefits of intervention for the child.

Case history

The master GH was 4 year old male child, had no schooling, came from middle socio economic status. His parents reported that he avoided looking at his family members and others, showed poor comprehension both verbal and gesture, manifested restlessness and poor concentration, involved in self play, had head banging and was walking one step forward and then backward with a duration of 18 months. He was born of full term cesarean delivery, birth weight was 2kg and 800g and birth cry was present. There was delay in attaining developmental milestones. Since two years his parents noticed the above symptoms. Child had no other complications of epilepsy and physical problems. He was not on any medication.

Test materials

After obtaining informed consent from parents, psychological assessment was conducted with the help of mother and also was based on independent observation of the child. The following tests were used.

The Childhood Autism Rating Scale (CARS); Schopler, Reichler and Renner, 1988) is a 15- items behavioural rating scale developed to discriminate between children with autism and those with other developmental disorders. Criterion-related validity was determined by child psychologist and correlated at $r = .80$ which indicated that the CARS diagnosis was in agreement with clinical judgments. Reliability coefficients for the CARS total score have been strong, ranging from .68 to .80 and above.

The Vineland Social Maturity Scale (VSMS) originally developed by E. A. Doll in 1936, which was then adapted by Dr. A. J. Malin in the year 1965. The scale was originally devised to measure the social abilities of persons suspected of mental deficiency. It provides an estimate of social age (SA) and social quotient (SQ) and shows high correlation (0.80) with intelligence. It is designed to measure social maturation in 8 social areas. The 1947 book included numerous case studies through which the scale has been validated. The reliability has been examined experimentally and statistically and found satisfactory.

The Denver Developmental Screening Test II (DDST-II): Developed by Frankenburg and Dodds, (1967). It is a 125 items standardized measure that is designed to use as a screening tool to detect whether child's development is within normal range. An independent researcher found correlations of .82 and .52 between the DDST and the Stanford-Binet and comparing PDQ-II to Denver II, obtained 96% agreement in results (N=73 clinical and 20 non-clinical). Test-retest reliability is 89% agreement between test scores for a 7 to 10 days interval between test administrations by the same tester.

The Receptive Expressive Emergent Language Scale (REELS) designed by Bzoch and League during 2003. The linguistic based

communication behaviours (receptive and expressive) of infants and toddlers from birth to 3 years of age and recently extended this scale till 6 years. The construct validity of the REELS appears to be greater for 2 and 3 years old than for 1 year olds, although the average language ages at each of the 3 age levels were equivalent to children's average developmental ages. Reliability of the REELS Agreement between different administrators for the infant population was studied, using this scale and it ranged from 90% to 100%. Administration of the scale in this manner, followed by reexamination after a three week interval, yielded on overall language quotient (LQ) correlation value of $rs=0.71$.

Procedures

It is a single case design with pre- and post-therapy assessment was adopted. The home based behavioural training for mother consisted of biweekly sessions at SRI-MD AUTISM RESEARCH FOUNDATION, Puducherry lasting for 2½ months.

Psycho-Education: Two sessions were carried out with mother to discuss about content and process of the programme. She was explained about the goals in detail and the need for the involvement of the mother to achieve the goals. The nature of autism and clinical features (Behavioural, Cognitive, Speech and Social), incidence, prevalence, course and outcome were explained.

Supportive Techniques: These strategies were aimed to deal with the emotional reaction to diagnosis on mother. These were used to help mother to cope with the emotional impact of diagnosis. Their disappointment and frustration on learning about the diagnosis and its implications were acknowledged. Ways of handling the stress without resorting to maladaptive coping were discussed. Positive methods such as effective coping and comprehensive management were discussed.

Behavioural and TEACCH Based Interventions

These were aimed to bring out improvement based on ABA and TEACCH parental training which included managing problem behaviours by explaining reinforcement, extinction, time out and developing new behaviours through prompting and shaping. Further mother was trained in communication skills through verbal and non-verbal modes. In addition to that socialization techniques were also taught to the mother.

a) *Enhancing eye to eye contact*: (1) placing the child in a darkroom and moving candle in front of him with a distance from one side to another. (2) Child was seated at eye level of mother and hold face and looking at eye and to talk to child.

b) *Communication Enhancement*: Child's mother was educated about certain principles of the TEACCH approach and encouraged to put them into practice.

- *Structuring physical environment*: Child's mother was told to demarcate specific areas for specific tasks and not let the whole house to be a place for play, for example the dining table should only be used for eating. Since the child had a problem in communication the specific intention of such measure was to create an environment that clearly communicated what was expected from him.
- *Structuring activities*: Once the time and place for activities were decided, the child's mother was to try and structure the activity itself. To do so activities were kept simple. All the objects needed were arranged in a particular order based on a

a top to bottom or left to right principle of arrangement. Nature, aim and expected duration of the activity were clearly defined. Visual, Verbal and auditory cues were used consistently to help the child understand, learn and gradually master the activity.

- *Structuring time:* The mother was instructed to organize the hours in a day in order to engage the child in a constructive and appropriate manner. Mother asked to break up child's activities in to various slots, example walking up to dining table during lunch time to dinner time and bed time etc. A specific list was made and the mother was to follow the same activity schedule daily. Use of various cues (object cues, object and picture cues, picture cues and word cues) was encouraged. Time structuring was used to cut down on maladaptive behaviours such as stereotypies and also to promote a degree of independence in the child (Malhotra et al., 2002).
- *Enhancing Social Skills:* A program plan was a detailed lesson plan that could be used by mother to teach a specific skill and written in a format to ensure that appropriate Discrete Trial Training, Pivotal Response Training and/or Functional Routines. The strategies used were joint attention, social stories, play therapy, modeling and mask and drama therapy.

Example: showing interest in other children: Initially mother was involved in helping the child with the directions. To play games within the family circle where older children lead the activity. To involve the child in very simple games such as blowing bubbles, passing a ball to one another, use a chair swing, simple doll play like dressing up a doll, feeding the doll. To organize simple games like singing and dancing to the music, dance with the child. Demonstrate clapping and marching to music. Praise child's performance by

clapping, hugging and saying "Very good".

Educational interventions

Mother was oriented to the TEACCH approach, she was demonstrated how the list of daily activities and self-help skills were drawn up. Visual cues, verbal cues and physical cues were used liberally. Mother was asked to prepare a list of the child's activities and carry out each activity in the simple and consistent pattern.

- *Example:* while the mother said the word "wash face" he also had a picture of washing face pasted on the cardboard, detailed verbal instruction and appropriate physical guidance were used.
- Placing a child in front of the mother the child was shown pictures to count the objects. To show picture one by one and tell 1, 2, 3 and so on and encourage him to imitate the sounds.

Post-assessment

After 20 sessions of training for the child's mother, the mother of the child carried out the home based training for 9 months.

Tests administered initially were administered again at the completion of the programme to assess the improvement gained by the child. Mother's evaluation of improvement for the child also was obtained.

Results and Discussion

The aim of the study was to compare the efficacy of the program, which was based on the home based applied behavior analysis therapy (ABA) program and TEACCH method. The data obtained after the home based program was compared with the initial data. Significant improvement over time was observed on the following measures: Total score of CARS, VSMS, DENVER and REELS. The details are discussed below.

Table 1: The pre and post intervention scores of CARS, reduction in scores and gain in percentage

Childhood Autism Rating Scale (CARS)				
Skill Areas	Pre-Test	Post-Test	Reduction in Scores	Gain in Percentage
Relating to People	3	2.5	0.5	16.66
Imitation	3	2	1	33.33
Emotional Response	3	2.5	0.5	16.66
Body Use	2.5	2	0.5	20
Adaptive Changes	3	2.5	0.5	16.66
Visual Responses	3	2	1	33.33
Listening Response	2.5	2	0.5	20
Verbal Communication	3	2	1	33.33
Non Verbal Communication	2.5	2	0.5	20
Activity Level	3.5	2.5	1	28.57
Intellectual Response	2	2	0	0
TOTAL SCORE	37	30	7	19.35

From the above table following findings are brought out, Considerable differences are shown on CARS scores. Pre-intervention score was 37 which indicates that the severity of autism was at moderate level. He had features of relating to people showed aloofness, persistent and forceful attempts were needed to get his attention and minimal eye contact was presented. He imitated only half of the time and required a great deal of persistence and help from others and his responses were limited and that too only after a delay. He showed definite signs of inappropriate type of emotional

reactions. Some minor peculiarities of repetitive movements, poor coordination and injuring himself were seen. He actively resisted changes in routine, tried to continue the old activity and became angry and unhappy when established routine was altered. He was looking at object from an unusual angle. He showed lack of response to sounds but was distracted by extraneous sounds. Speech was absent and some peculiar sounds or jargon were used occasionally. He had over activity and shifted from one task to other.

Subsequent to intervention (9 months duration) there was reduction in symptoms. Eye to eye contact improved and was able to relate to people, occasional imitated sounds, words and movements which were partially appropriate. He showed minimal emotional response as indicated by change in facial expression and posture. He was able to tolerate changes without undue distress and listening behavior mildly improved. He spoke 10 words could use two word sentences and understood few gestures.

His activity level reduced to some extent. Intellectual level showed no difference. His post-intervention score was 30 (reduction of score 7) and severity level became mild. The overall gain is 19.35%. Similar findings were reported by Kishore (2008). In his study he found significant changes on compulsive behaviours of a child with Autism by using applied behavioural analysis. The author also found significant gains in overall adaptive behaviours.

Table 2: The pre and post intervention scores of DENVER, & VSMS, gain in Scores and gain in percentage

Denver Developmental Screening Test II				
Skill Areas	Pre-Test	Post-Test	Gain in Scores	Gain in Percentage
Gross Motor	21	40	19	90.47
Language	5	7	2	40
Fine Motor	11	20	9	81.81
Personal & Social	12	17	5	41.66
DA	15	27	12	80
DQ	40	55	15	37.5
Vineland Social Maturity Scale (VSMS)				
Self-Help General	16	22	6	37.5
Self-Help Eating	16	21	5	31.25
Self-Help Dressing	13	24	11	84.61
Locomotion	20	39	9	95
Occupation	16	24	9	50
Communication	6	10	4	66.66
Socialization	7	17	10	142.85
SA	15	27	12	80
SQ	40	55	15	37.5

Findings of Denver: Pre intervention revealed that, in gross motor and fine motor skills he was able to kick a ball overhead, thumb finger grasp developed, held in hand 2 cubes. In the language area, he turned to rattle sound. In the area of personal and social behavior, he could indicate his wants. Based on the above skills, his Developmental Age (DA) was 15 months and Developmental Quotient (DQ) was 40. Post-intervention revealed that, in the area of gross motor behavior and fine motor skills he was able to balance each foot for 1 second and made tower of 2 cubes. In language area, he used dada, mama and non specific syllables. In the area of personal and social behavior he drank water from cup. During post intervention his DA was 27 months and DQ was 55. He gained 15 points indicating significant improvement.

Findings of VSMS: In self help skills, he indicates to go to toilet and drank from glass unassisted. In the dressing behaviour, he pulled off socks and shoes unassisted. In the locomotion area, he walked upstairs unassisted. In the occupation area, he fetched what was asked and touched familiar objects when asked to do so. In the

communication area, he was able to imitate sounds occasionally. In the area of socialization, he demanded personal attention. Pre-intervention score showed that, his Social Age was 15 months and Social Quotient was 40. After intervention in the self help skills of eating behaviour he removed wrapper. In dressing, he pulled out banian. In the locomotion area, he walked downstairs one step per tread unassisted. In the area of occupation, he initiated play activities. In communication behavior, he was able to follow simple instructions. In the area of socialization, he was able to play with other children. After intervention, he had shown considerable improvement, his SA was 30 and SQ was 61. He gained 29 points. Based on the above findings cognitive, developmental and social maturity showed marginal improvement to a considerable extent. Remington et al. (2007) reported that there was advantage of 12 months on four of the sub-domains of Vineland sub-domains. They showed significant gain on socialization and communication domains. They concluded that in all cases the intervention therapy group was out performing than the control group.

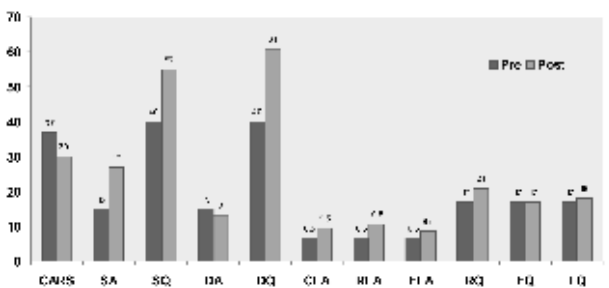
Table 3: The pre and post intervention scores of REELS, gain in scores and gain in percentage

Receptive-Expressive Emergent Language Scale (REELS)							
Skill Areas		Pre-Test	Post-Test	Gain in Scores	Gain in Percentage		
Receptive Language Age (RLA)		6.5	10.5	4	61.53		
Expressive Language Age (ELA)		6.5	8.5	2	30.76		
COMBINED LANGUAGE AGE (CLA) RECEPTIVE EXPRESSIVE LANGUAGE							
(In Months)		QUOTIENT (RQ)		QUOTIENT (EQ)		QUOTIENT (LQ)	
Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
6 Months	9 Months	17	21	17	17	17	18

The above table shows the child's Language level as assessed by REELS. During initial assessment his Combined Language Age was 6 months, both Receptive Age and Expressive Age was 6 to 7 months. Receptive Quotient and Expressive Quotient was 17 each as assessed and Language Quotient was 17. He recognized names of his family members, responded to simple gestures, repeated combinations of 2 syllables and responded when called by his name by turning his head. After intervention, his RLA was 10 to 11 months, ELA was 8 to 9 months and CLA was 9 months. The RQ was 21, EQ was 17 and LQ was 18. He was able to follow simple commands, understood simple questions. He used gesture language such as shaking head and mimicking sounds. He had minimal improvement in language usage. The gain was 3 months. Remington et al. (2007) found that intervention group compared to the control group showed significant differences on language scale and expressive and receptive language. Another study by Lal and Bali (2007) in their study by used visual strategy training on development of communication skills found significant improvement in communication skills for the treatment group.

Mother's report about the improvement

The home based behavioural intervention of autism is usually more complicated than the intervention of other disabled child. The intervention of autism requires both short-term and long-term needs of the child and parents to be met (Cohen & Volkmar, 1997). Mother of child after the home based behavioural intervention program reported significant improvement in her child's development from pre to post intervention stage. She reported much improvement in the child's symptoms and skills. Hyperactivity, adamant behaviour and repetitive movements were decreased, improved in eye contact, cognitive skills, communication level, social play and his self help skills. Further there was significant improvement in motor skills and daily routine.



Graphic representation of scores of Pre - Post Intervention on various measures of child's behaviours and skills.

The above graphic representation shows child's overall improvement is significant.

Conclusion

Reduction in CARS score is significant. The boy had improved in relating to people, showed minimal emotional response, tolerated changes to some extent and over activity reduced to some extent. Overall gain is 19.35%. After intervention his gain in Developmental Quotient (DQ) is 12 months and gained 15 points in DQ. In Social Maturity he had shown overall improvement, the gain was 15 months and the gain in Social Quotient (SQ) is 21 points. Language development (REELS), he had overall gain of 3 months which shows he had minimal improvement in language usage. This child had

shown considerable overall improvement except socialization and language usage. It is concluded that home based ABA and TEACCH intervention by mother has shown overall improvement of the child.

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