Original Research Article

Benefits of home-based stimulation versus institutional intervention of speech and language on spectrum of children with autism during COVID-19 lockdown

Nikita Chatterjee[1]*, Ambika Bose[1], Robin Singh[1], Suman Kumar[2]

[1]Department of Audiology and Speech language Pathology, Ali Yavar Jung National Institute of Speech and Hearing Disabilities, RC, Kolkata, India
[2]Department of Speech Language Pathology, Ali Yavar Jung National Institute of Speech and Hearing Disabilities, Mumbai, Maharashtra, India

*Correspondence:
Dr. Nikita Chatterjee,
E-mail: nikitachatterjee009@gmail.com

ABSTRACT

Background: The study aims to evaluate and compare the effectiveness of home-based stimulation and institution-based speech and language interventions in children with autism spectrum disorder (ASD).
Methods: An exploratory study was conducted on 26 children aged 2.5 to 5 years (mean age: 3.39 years, SD±0.47) with communication difficulties. The participants were divided into two groups: Group I (n=12) received home-based stimulation administered by caregivers, with monthly professional monitoring and guidance. Group II (n=14) received institution-based intervention, attending sessions twice weekly. Post-intervention evaluations were conducted after three months.
Results: Both groups demonstrated significant improvements in receptive language (p<0.05), with higher scores observed in Group II, particularly in children with traits or mild autism, followed by moderate autism. Expressive language skills showed significant pre- and post-intervention improvements in both groups (p<0.05). Attention skills improved significantly within and between groups (p<0.05). Social and cognitive skills also improved significantly in both groups, although group II exhibited better social and cognitive improvements overall. In contrast, group-I showed stronger gains in cognitive skills compared to social skills.
Conclusions: Both home-based and institution-based interventions positively impacted children with autism. However, a combination of these approaches yielded the most substantial benefits for the children's developmental outcomes and contributed positively to the mental health of their caregivers.

Keywords: COVID-19 pandemic, Lockdown, Autism spectrum disorder, Speech language intervention

INTRODUCTION

Autism spectrum disorder (ASD) is an umbrella term for a group of neurodevelopmental disorders characterized by difficulty in communication and interaction, presence of stereotyped speech and motor behaviorr.[1] Various factors are associated with development of autism including the genetic, neurobiological, and environmental factors, which cannot be always pinpointed.[2]

Epidemiological studies on ASD in India highlighted that rural setting showed a prevalence of 0.11% in children aged 1-18 years; and in the urban setting, prevalence of 0.09% in the children aged 0-15 years.[2]

Children with autism are often found with major difficulty in the social aspect of communication and understanding the pragmatics of their situation.[3] Hence, it is vital to follow an approach that covers facilitation of

not only linguistic skills but also social (pragmatic) communication skills and cognitive and environmental awareness. A pragmatic approach is one such approach. Pragmatic language approach includes facilitation of three main skills: using language for encouraging interpersonal communication, changing language by varying prosodic features, and understanding conversational turns (topic initiation, maintenance, and termination) in a social context of interpersonal communication.[4]

The lockdown imposed during COVID-19 pandemic intruded on the children's physical activity and social skills by confining them in their homes.[5,6] The pandemic has caused sudden changes in the environment, it has been the most challenging experience affecting the psychosocial and emotional aspects causing disturbed daily routine, detachment from people, increased the risk of developing neurodevelopmental disorder like ASD and attention-deficit/hyperactivity disorder and other health issues like obesity, anxiety, etc.

The necessary public health care actions taken to control the spread of COVID-19 caused serious changes in the way of nurturing the children, intruding with the children's physical activity and social skills.[7] During the lockdown period, the management strategies of children with autism have undergone drastic changes. Parents feel threatened to take their child long distances, in crowded places and taking them outside the house; and tele-rehabilitation or home-based programs and plans were provided.

Parents preferred to choose home stimulation and therapeutic services rather than visiting institutes and rehabilitation centers in regular intervals due to safety purposes, time constraints, and travel restrictions. There is a paucity in literature that reports such changes and their impact on children's development. Hence, the need of this study is an attempt to observe the impact on speech, language, and other developmental skills of children with autism with home-based management versus institutional-based management using traditional therapeutic approach. The primary goals of treatment will be to maximize child's ultimate functional independence and quality of life by minimizing the core ASD features.[8]

Hence, the aim of this study is to evaluate and compare the impact of home-stimulation versus institution-based speech and language intervention benefits on spectrum of children with autism.

METHODS

This exploratory study was conducted between March 2022 and May 2023 at the Ali Yavar Jung national institute of speech and hearing disabilities, regional centre, Kolkata. It involved 26 subjects aged 2.5 to 5 years (mean age: 3.39 years, SD±0.47) with complaints of difficulty in communication. The subjects selected for the study exhibited symptoms of autism and underwent a protocol-based evaluation for diagnosis as per the Indian scale of autism assessment (ISAA). Table 1 illustrates the Demographic data mentioning the mean age, and degree of autism severity, showing how the ISAA scores were allocated to each group.

Table 1: Demographic details of participants mentioned mean ages, and degree of autism severity according to the ISAA scores.

ISAA	Mean ISAA score (SD) During pre-intervention assessment	Total no. of children n=26, (Mean age: 3.39 years, SD±0.47)	Group-I (home-based) n=12, (mean: 3.16 years, SD±0.56)	Group-II (institute-based) n=14, (mean: 3.62 years, SD±0.35)
No autism (Autistic traits)	67.8; (±0.67)	9	4	5
Mild autism	96.67; (±0.5)	10	5	5
Moderate autism	111.67 (±0.66)	7	3	4

The subjects were then divided into two groups: Group I (12 subjects) and group II (14 subjects). The subjects in group I received caregiver-based stimulation at home for various reasons, which are beyond the scope of this study. Subjects in group II attended the Institute with their caregivers twice a week to receive intervention services in a clinical setting. Severe autism and related disorders including developmental delay, cerebral palsy, intellectual disability, specific language impairment, pragmatic language impairment, and hearing impairment were among the exclusion criteria, and these individuals were not included in the study.

Description of tools used

ISAA autism

ISAA was used for quantifying severity of autism. The ISAA is an objective assessment method for people with autism that includes observation, clinical behavior evaluation, testing through interaction with the individual, and information from parents or other carers to complete the diagnosis. The 40 questions on the ISAA are broken down into six domains: social relationships and reciprocity, emotional responsiveness, speech

language and communication, behavioral patterns, sensory features, and cognitive components.[9]

Reynell's attention scale

Reynell's attention scale outlines six levels of attention development across different age ranges. At Level 1 (0-1 year), attention is fleeting and easily disrupted by new events. Level 2 (1-2 years) marks single-channel attention where children focus on self-chosen activities but are disrupted by verbal interference. By level 3 (2-3 years), attention remains single-channel, but children stop activities to respond to adults. At level 4 (3-4 years), attention becomes more controllable, with adult verbal guidance aiding focus.

Level 5 (4-5 years) introduces integrated attention for short periods, while level 6 (5-6 years) reflects fully integrated attention, with auditory, visual, and the manipulative focus effectively maintained.[10]

Cognitive, social, and emotional skills

Cognitive, social, and emotional skills were assessed using the communication DEALL developmental checklist (CDDC). The CDDC is a criterion referenced checklist, to assess developmental skills in 8 domains-namely, gross, and fine motor skills, activities of daily living, receptive and expressive language skills, and cognitive, social, and emotional skills-at 6-month intervals, from 0 to 6 years of age.[11]

Assessment of language development

Assessment of language development (ALD) is a criterion-referenced diagnostic tool used to measure the language development in children; from birth to 7.11 years covering both receptive and expressive language skills.[12]

Brown's (1973) stages of MLU assessment (Brown, 1973)

Brown (1973) proposed five stages of mean length of utterance (MLU) development, reflecting linguistic growth in young children. In stage 1 (MLU: 1.0-2.0, age: 12-26 months), children develop semantic roles and syntactic relations.

Stage 2 (MLU: 2.0-2.5, age: 27-30 months) involves the emergence of grammatical morphemes to modulate meaning. Stage 3 (MLU: 2.5-3.0, age: 31-34 months) is characterized by the use of simple sentence modalities.

Stage 4 (MLU: 3.0-3.75, Age: 35-40 months) introduces sentence embedding, and stage 5 (MLU: 3.75-4.5, age: 41-46 months) marks the development of co-ordination in sentence structures. Beyond stage 5 (MLU: 4.5+, age: 47+ months), children demonstrate advanced linguistic complexity.[13]

Closed-set multiple choice parental feedback questionnaire

A visual analog scale-based questionnaire was provided to the caregivers after the three months of therapeutic intervention. The questionnaire was a 6-point scale ranging from 0 to 5 where 0 indicated strongly disagree to 5 indicated strongly agree. Each question was asked twice, once for pre-intervention perception and once for post-intervention ability understanding, as depicted in Table 2.

Each questionnaire item was given to five audiologists, speech-language pathologists, and one clinical psychologist who have a combined experience of 20 years working with the pediatric neurodivergent population and active involvement in early intervention, parent-child relationships, and family carers counselling before being used with the subjects' caregivers. Using Cronbach's alpha, the validity and internal consistency of each questionnaire item were examined. The derived Cronbach's alpha of 0.727 indicates that the scale employed for this assessment had adequate internal consistency.

Procedure

Subjects fitting the selection criteria were chosen for the study and their caregivers were informed about the need and purpose of the study. Voluntary consent permission and cooperation was agreed upon by the caregivers for the study. After the ethical clearance, the study conducted into four phases.

Pre-intervention evaluation

The pre-intervention evaluation revealed that attention skills in both groups were at level 1 (fleeting attention). The receptive language age (RLA) means were 4.09 years (SD±0.21) for group I and 3.96 years (SD±0.13) for group II, while expressive language age (ELA) means were 5.07 years (SD±0.14) and 5.13 years (SD±0.11), respectively. Both groups exhibited an MLU of 0.63, corresponding to a developmental age of 12-26 months. Autism severity assessment (ISAA) identified 8 subjects with autistic traits (mean score 67.8, SD±0.67), 10 with mild autism (mean 96.67, SD±0.50), and 8 with moderate autism (mean 111.67, SD±0.66), evenly distributed across the groups.

Pre-intervention cognitive skills were at 1.24 years (SD±0.81) in group I and 1.20 years (SD±0.76) in group II, with both acquiring 7 items. Social skills developmental ages were 0.83 years (SD±0.42) for group I and 1 year (SD±0.56) for group II, with no significant differences (p=0.396). Emotional skills were comparable, with both groups at 0.83 years (SD±0.72 for group I, SD±0.51 for group II) and acquiring 5 items, showing no statistical disparity (p=1.00>0.05).

Therapeutic intervention

In the second phase, intervention plans were developed and implemented for both groups, following the pragmatic language approach. In group I, the subjects received stimulation from their parents and caregivers at home, as advised. Additionally, the parents and children visited the institute once a month for professional monitoring, guidance, and counseling. Group II participants attended speech-language intervention sessions twice a week, each session lasting 45 minutes. Following each session, there was a 15-minute parental counseling component.

During the speech-language intervention, individualized programs were created for each child based on their determined baseline. These programs were designed to address specific goals and targets. Over the course of three months, the study focused on monitoring the progress of the participants and implementing child-specific activities to achieve the following goals: Strengthening cognitive abilities, developing attention skills, enhancing receptive language skills and expressive language skills, facilitating social interaction and communication and facilitating emotional development.

The activities and interventions were tailored to each child's individual needs and aimed to facilitate their overall development and communication skills. The activities planned under each goal of intervention are presented in Table 5, showcasing the specific interventions and strategies designed to target the development of receptive language skills, expressive language skills, attention skills, cognitive abilities, social interaction and communication, and emotional development.

Techniques included in the intervention to facilitate language development during interactions with the child were as follows:

Self-talk: Parents were encouraged to talk about the activities they were engaged in, including objects, places, and events in the immediate context.[14]

Parallel talk: Parents were shown how to describe the subjects' own actions during interactions.[14]

Child-directed speech: Parents were guided to use a higher-pitched voice with inflections, a slower rate of speech, fluent and repetitive pronunciation, and more frequent and longer pauses between words. This type of speech is known to support speech and language development.[15]

Joint action routines (JARs): Routine activities were set up to encourage communication skills in children with autism. These routines involved predictable and logical sequences of events, using the same words each time, and repetition on a regular basis during interactions between parents and children.[16]

Scaffolding: Parents adjusted the level of support provided based on the cognitive potential of the child. They offered more guidance when the child struggled with a particular activity and gradually reduced support as the child made progress.[16,17]

Expansion of language: Parents were instructed to expand on the words spoken by the child, transforming them into short phrases or sentences to further develop their language skills.

These techniques were incorporated into the intervention to create a supportive and enriched language-learning environment for the children with autism. For both groups the goals were targeted for the three months of monitoring, through individual child-basis activities, as depicted in Table 3.

Counseling

Parents received counseling regarding the benefits of language stimulation and the importance of creating a supportive language-learning environment to enhance their child's language and verbal communication skills. They were advised that language stimulation strategies could be incorporated into various interactions and activities of daily living, parent-child interactions, family quality time, and discussions. Additionally, parents were encouraged to create communicative incidents such as storytelling, reading or writing activities, engaging in performing arts, and involving their child in kitchen and household activities.

Post-intervention evaluation

The three-month intervention period, the pre-intervention assessment test tools were administered again to evaluate the progress made by the participants. Post-therapeutic scores were documented to assess the impact of the intervention on the participants' developmental outcomes. This phase aimed to measure the effectiveness of the intervention and determine the extent of improvement in the targeted areas of language, communication, and other developmental skills for children with autism.

Statistical analysis

After compiling the pre- and post-intervention data from all the test tools, statistical analysis was employed using the independent sample's T-test in SPSS (version-20). The data was subjected to Shapiro-wilk test for normalcy, and it was found that the data followed normal distribution. Hence, parametric paired t-test was administered to obtain the statistical differences among pre-and-post intervention status of the groups at the significance level of 0.05.

RESULTS

The current study aimed to evaluate and compare the impact of home-stimulation versus institution-based speech and language intervention benefits on spectrum of children with autism. The paired t-test was administered to find the statistical difference between the pre, and post intervention scores obtained in the considered tools, among the two groups with respect to the attention level, receptive and expressive language skills, and MLU. At last, the parental feedback questionnaire was administered for both the groups.

Attention level

The results for the Reynell's attention scale suggested that the pre-intervention attention skills of both group-I and group-II children were at level 1 which means all the subjects exhibited fleeting attention. In post-intervention assessment it was found that group-I upgraded to level 3, while attention skills of group II developed to level-4. Hence, a significant difference in attention skills was found between the pre and post data of both the groups (p=0.0003<0.05) as well as between group (p=0.0065<0.05) where the group-I score had improved but poorer than group II. These differences can be seen in Figure 1.
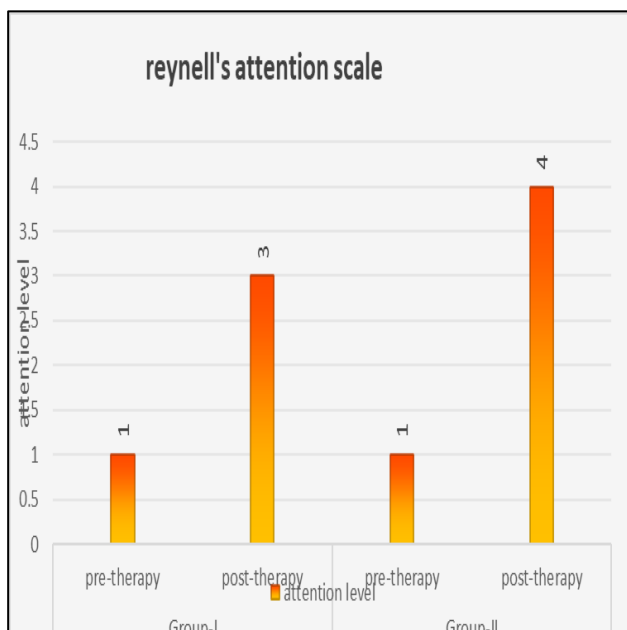

Figure 1: Comparison of pre and post intervention attention level of both the groups.

Language skills

According to the results of the ALD, after three months of intervention, the RLA for subjects in group-I was 8.16 months, while for group-II it was 10.47 months. In terms of ELA, group I had a mean ELA of 7.96 months, while group II had a mean ELA of 9.62 months. Comparing the pre- and post-intervention data, there was a significant difference in both RLA (p=0.0001<0.05) and ELA (p=0.0001<0.05), indicating a significant improvement in language development for both groups after the intervention.

However, when the pre- and post-intervention data were analyzed separately for each group, there were no significant differences in the pre-intervention findings for RLA (p=0.0657>0.05) and ELA (p=0.233>0.05) between 2 groups as depicted in Table 3. On the other hand, post-intervention RLA (p=0.0001<0.05) and ELA (p=0.0001<0.05) showed significant differences between 2 groups, suggesting that after intervention, group-II subjects had significantly improved RLA and ELA compared to group I, findings are depicted in Table 4.

Mean length of utterance

In pre-intervention phase, both group I and II functioning below stage I, which corresponds to a language age of 12-26 months. The mean MLU for group I was 0.63 (±0.13), and for group II, it was 0.65 (±0.22). These values indicate that both groups had MLU scores below expected range for their respective language stages.

After the intervention, the mean and SD values of MLU were measured separately for group I and II. For group I, the mean MLU increased to 1.9 (±0.56), indicating that the participants in group-I progressed to stage-I (12-26 months) in their language development. Similarly, for group II, the mean MLU increased to 2.05 (±0.45), indicating that the participants in Group-II progressed to stage II (27-30 months) in their language development.

Although there were slight differences in the post-intervention MLU scores between the two groups, the group-wise comparison of the pre-intervention and post-intervention scores did not show any statistical significance. The p value for the comparison of pre-intervention scores was 0.78 (>0.05), indicating no significant difference between the groups in the pre-intervention phase. Similarly, the p value for the comparison of post-intervention scores was 0.45 (>0.05), suggesting no significant difference between the groups after the intervention. These results suggest that both groups showed significant improvement in MLU after the intervention, as depicted in Table 4. The higher mean MLU values in group II compared to group I indicate that Group-II participants had greater language complexity in their utterances after the intervention.

Cognitive, social, and emotional skills

The communication DEALL developmental checklist (CDDC) was employed to assess the cognitive, social, and emotional aspects of development in two groups. In the post intervention assessment, the group I achieved the cognitive skills of 1.83 years (±0.53) and they acquired a total number of 11 items. Group II achieved the cognitive

skills of 1.66 years (±0.62) with total no. of items acquired was 10. Comparing these results with the pre-intervention findings, it was observed that there was a significant difference between pre and post intervention scores of group I (p=0.046<0.05). However, there was no significant difference between pre and post intervention score of group II (p=0.091>0.05). This suggests that although both groups showed improvement, group I, which received parent-mediated home intervention, demonstrated significant increment in cognitive skills.

For social skills, subjects from group-I achieved the age of 1.33 years (±0.47) with total no. of items acquired was 8 while group II achieved 1.66 years (±0.64) with total no. of items acquired was 10. Comparing with the pre-intervention findings, it was found that, there was a significant difference between pre and post intervention scores of group I (p=0.011<0.05) and II (p=0.0074<0.05). this suggest there was significant impact of intervention obtained in both the groups with respect to social skills.

For emotional skills, subjects from group I achieved 1.83 years age (±0.47) with total number of items acquired was 11 and group-II achieved age 1.5 years (±0.59) and they acquired a total number of 9 items. Comparing with the pre-intervention findings, it was found that, there was a significant difference between the pre and post intervention scores of group I (p=0.0006<0.05) and group-II (p=0.0035<0.05). this suggest there was significant impact of intervention obtained in both the groups with respect to emotional skills.

Furthermore, when a group-wise comparison was conducted between the post-intervention data, it was observed that after three months of intervention, there were no significant statistical differences in cognitive skills (p=0.463>0.05), social skills (p=0.153>0.05), and emotional skills (p=0.132>0.05) between group-I, which received parent-mediated intervention, and group-II, which received institution-based intervention. This indicates that two different intervention approaches did not lead to significant variations in the observed skills among the two groups, which is depicted in Table 6.

Closed-set multiple choice visual analog parental feedback questionnaire

The findings from the questionnaire shed light on the experiences and perspectives of parents in two different groups, as depicted in Table 7. In group I, where parents played an active role as facilitators, they encountered a dynamic and challenging journey during home stimulation. They faced hurdles that necessitated the use of scaffolding techniques to aid their child's acquisition of new skills. However, setting new goals after achieving previous ones proved to be a daunting task for these parents. Nevertheless, they expressed satisfaction with the intervention, counseling, and overall benefits derived from it. Particularly, they observed notable improvements in their child's receptive and expressive language skills, which garnered strong agreement. On the other hand, their opinions were more neutral or disagreed regarding improvements in social and emotional skills. Group I parents demonstrated a strong agreement and fulfillment with their role as primary facilitators.

In group II, as shown in Table 7, parents exhibited a greater reliance on clinicians for setting goals, developing intervention plans, and delivering the intervention itself. Consequently, they reported feeling less confident as primary facilitators, resulting in a more neutral stance regarding satisfaction with their role. They faced challenges in balancing their other responsibilities with their child's intervention, a sentiment shared by parents in both groups. However, the clinicians' demonstrations of home stimulation and activities carried over to the home environment proved to be highly beneficial for parent-child interaction, bonding, and reducing parental stress about their child's future and upbringing. Despite these benefits, group II parents found the concept of complete dependence on home stimulation and intervention difficult to sustain over a long period due to the lack of regular monitoring and participation of trained professionals. Overall, Table 6 depicts, both groups of parents acknowledged the inherent challenges of home stimulation, but they appreciated its positive impact on their child's development and parent-child relationship.

Table 2: Parental feedback questionnaire.

Questions	0 Strongly disagree	1 Disagree	2 Neutral	3 Agree	4 Strongly agree
I am satisfied from the intervention provided to my child					
I am satisfied with the counselling provided					
I am satisfied with the overall improvement/benefits from the intervention					
I am satisfied with the child's receptive and expressive language skills					
I am satisfied with the child's social skills					
I am satisfied with the child's cognitive skills					
I am satisfied with the child's emotional skills					
I am happy in my role of primary facilitator as parent					

Questions	0 Strongly disagree	1 Disagree	2 Neutral	3 Agree	4 Strongly agree
It is difficult to balance different responsibilities with child's therapeutic activities at home.					
I enjoyed spending time with my child by means of the therapeutic activities.					
I feel home-stimulation is more challenging than institutional intervention because of difficulty in understanding instruction and disparity in transfer of skills.					
I feel the role of primary facilitator enriched the closeness with my child (improved parent-child interaction and bonding)					
I feel my stress level about my child's future and upbringing is reduced significantly after following the therapeutic intervention.					

Table 3: Intervention plan programmed for execution.

Serial	Goals of intervention	Iˢᵗ month	IIⁿᵈ month	IIIʳᵈ month
1	Strengthening cognitive pre-requisites for language learning	Imitation	Object permanence	Use of objects
2	Facilitation of preverbal skills	Attention	Eye-contact	Joint attention
3	Facilitation of receptive and expressive language skills	Requesting	Informing	Promising
4	Facilitation of social (communication) skills	Acknowledging those present	Greetings	Mixing with others
5	Developing emotional and environmental awareness	Self-independency	Sharing	Helping others

Table 4: Comparison of pre and post intervention receptive and expressive language scores obtained through the ALD.

ALD parameters	Groups	Pre	Post	T value pre	Df	T value pre	Pre (Group-I vs group II) T value	P value	Df	Post (Group-I vs group II) T value	P value
RLA	Group I	4.09 (±0.21)	8.16 (±0.48)	26.91	22	0.0001	1.9283	0.0657*	24	7.8880	0.0001
	Group II	3.96 (±0.13)	10.47 (±0.91)	26.49	26	0.0001					
ELA	Group I	5.07 (±0.14)	7.96 (±0.67)	14.63	22	0.0001	1.2236	0.2330*	24	6.7401	0.0001
	Group II	5.13 (±0.11)	9.625 (±0.59)	28.03	26	0.0001					

*0.05 level of significance

Table 5: Comparison of pre and post intervention MLUs.

MLU	Pre	Post	Df	T-value	P value	Pre (Group I vs group II) T value	P value	Df	Pre (Group I vs group II) T value	P value
Group I	0.63 (±0.13)	1.9 (±0.56)	22	7.6526	0.0001	0.2759	0.7850	24	0.7574	0.4562
Group II	0.65 (±0.22)	2.05 (±0.45)	26	10.4578	0.0001					

*0.05 level of significance

Table 6: Comparison of cognitive social and emotional skills in communication DEALL developmental checklist.

Age (in years)	Item no.	Pre-intervention Cognitive skills Gp I	Cognitive skills Gp II	Social skills Gp I	Social skills Gp II	Emotional skills Gp I	Emotional skills Gp II	Post-intervention Cognitive skills Gp I	Cognitive skills Gp II	Social skills Gp I	Social skills Gp II	Emotional skills Gp I	Emotional skills Gp II
48-42	24												
	23												
	22												
42-36	21												
	20												
	19												
36-30	18												
	17												
	16												
30-24	15												
	14												
	13												
24-18	12												
	11							A				A	
	10							A	A		A	A	
18-12	9							A	A		A	A	A
	8							A	A	A	A	A	A
	7							A	A	A	A	A	A
12-6	6	A	A					A	A	A	A	A	A
	5	A	A	A	A	A		A	A	A	A	A	A
	4	A	A	A	A	A	A	A	A	A	A	A	A
6-0	3	A	A	A	A	A	A	A	A	A	A	A	A
	2	A	A	A	A	A	A	A	A	A	A	A	A
	1	A	A	A	A	A	A	A	A	A	A	A	A

Gp- group, The dotted line depicts the chronological age at the time of assessment; the chronological age during the pre-intervention was 3.39 (±0.47) and the chronological age during the pre-intervention was 3.91 (±0.41). Each "Achieved skill" is denoted by 'A'.

Table 7: Summary of results illustrated using Johari window.

Mode of intervention Outcomes	Home stimulation supported by once-a-month demonstration intervention	Institute based rehabilitation + home stimulation
Improvement of subjects	Visibly Present	Enhanced rate
Parental well being	Improved	Enriched

DISCUSSION

The current study was done to find out the efficacy of home-based stimulation versus institution-based stimulation following a structured traditional approach of intervention. The outcomes of intervention were measured after three months which suggested that there was significant improvement in overall developmental skills in both the groups. When the affected aspects of development were understood tool-wise, it was found that in attention skills, all the subjects were at level 1, which means all the subjects exhibited fleeting attention. In post-intervention assessment it was found that group-I upgraded to level 3, that is, single channeled as the child attends adult's choice of activity but still difficult to control. Attention skills of group-II developed to level-4 post-intervention i.e., single-channeled but more easily controlled (focusing attention).

In ALD, it was found that there was significant improvement in both receptive and expressive language

skills. Children with traits developed more spontaneous jargon speech and echolalia while mild and moderate autism showed more echolalia in group-II. A study conducted a meta-analysis revealing that parent-implemented language interventions resulted in a 20% increase in receptive and expressive language.[18] Similarly, the current study showed post-intervention improvements in language, with group II displaying a more significant enhancement in expressive skills due to structured and controlled environments.

In MLU it was found that the pre-intervention scores were 0.63 in all subjects which is less than 12-26 months but after intervention, MLU increased in a progressive rate but social usage improved more in group II which let to better MLU in meaningful context in group II. A study found that naturalistic developmental behavioral interventions (NDBIs) enhanced attention, language, and social communication, with a mean improvement of 25% in these domains.[19] These findings parallel the current study's results, where both groups exhibited an increase

in MLU scores, with group II showing higher social contextual usage.

Closed set parent-based questionnaire suggested family dynamic, lack of time and models, and excessive screen exposure were the main issues faced by parents in both the groups hindering child's improvement. A similar study reviewed early intervention practices and highlighted that both home-based and structured, institution-based programs can improve developmental outcomes, especially when parent training is incorporated.[20] Consistent with these findings, the current study demonstrated that parent-based closed-set questionnaires revealed barriers such as family dynamics and screen exposure, which, when addressed, contributed to improvements across both groups.

The current study showed that a structured pragmatic-based approach for children with autism can bring about significant improvement. Although group-II had more improvement in attention-level, receptive and social skills, both the groups showed a similar trend of the receptive skills exceeding the expressive skills ability post intervention and improved cognitive skills. A study evaluated the early start Denver model (ESDM) in toddlers with autism, reporting a 17% improvement in cognitive skills and substantial advancements in receptive and expressive language.[21] Similarly, the current study found significant post-intervention improvement in receptive language skills across both groups, with group II outperforming group I in terms of spontaneous jargon and social usage of language.

A study conducted to understand the effect of teach-based home-program on children with autism showed three to four times more progress in children who received treatment.[22] Children once diagnosed should receive intervention as early as possible. This study proves that home-based stimulation irrespective of the situation will provide benefit to these children and should always be an option when counseling for child's intervention.

CONCLUSION

This study highlights the comparative benefits of home-based and institution-based rehabilitation for children with autism, addressing the challenges faced by parents who cannot attend regular intervention sessions. Both approaches led to significant developmental progress, with institution-based interventions showing greater impact on social, emotional, and pragmatic skills. The findings underscore the importance of combining home stimulation with structured, professional guidance to optimize developmental outcomes and support parental well-being. While differences in outcomes exist, the study advocates for developing a structured protocol for home-based speech and language management, enabling parents to play an active role in their child's intervention. Professional involvement remains crucial for goal setting, monitoring progress, and achieving comprehensive

developmental milestones. This approach advances understanding by emphasizing the synergy of home and professional interventions, paving the way for more inclusive and flexible rehabilitation strategies.

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