

Language Skills in 3 To 5 Year Old Children with Repaired Cleft of Lip and Palate

¹Deepthi K.J., ²Pushpavathi M.

¹Research Fellow, Department of Speech-Language Pathology, All India Institute of Speech and Hearing, Mysore, Karnataka, India

²Professor in Speech Pathology, Department of Speech-Language Pathology, All India Institute of Speech and Hearing, Mysore, Karnataka, India

Abstract: Children with cleft of lip and palate (CLP) are reported with both speech and language disorders. Several studies have been done to investigate the salient feature of speech in children with CLP. However the studies focussing on assessing the language parameter using standardised test battery is limited in Indian context. In lieu of this the current study aimed at assessing children with repaired cleft of lip and palate (RCLP) who have not accessed speech language rehabilitation post surgery using a standardised language assessment material viz., Kannada Language Test (KLT). Twenty children with RCLP were grouped based on age into 3 to 4 year old group and 4 to 5 year old group. Twenty age matched typically developing children were also selected for comparison. KLT was administered on each child and scores obtained were analysed with appropriate statistical measures. The results revealed that children in RCLP had poor language scores compared to TDC. There was a developmental trend noted in the language scores as in both RCLP and TDC groups. There was also a significant difference in language scores noted between RCLP and TDC in the 3 to 4 year age group. However the same was not noted in the 4 to 5 year old group. Further the receptive skills were found to be better than the expressive scores. The reasons for such findings in relation to Indian context are discussed.

Keywords: Repaired cleft of lip and palate, Kannada Language, Kannada Language Test.

I. INTRODUCTION

Cleft of lip and palate (CLP) is a common congenital craniofacial defect. In India forty thousand children with CLP are reported every year [1]. The children with CLP are reported with an array of deficits such as craniofacial deformity, feeding difficulties, orthodontic issues, aesthetic issues, psycho-social issues and communication disorders [2], [3], [4]. It was initially considered that children with CLP tend to exhibit only speech deficits, as they possess good intellectual ability to learn language and its rules [5]. However there has been increasing number of studies identifying the presence of language deficits in children with CLP.

The expressive language difference between children with CLP and their age matched typically developing children (TDC) begin to emerge around 9 months, during the canonical babbling stage [6], [7], [8]. They were also found to have smaller consonant inventories with fewer stops, glides, velars consonants and more number of glottal stops in their utterances [7]. This restricted number of consonant repertoire limits the variety of sound combinations produced by children with CLP making them vulnerable to expressive language delay [9].

Further studies in language development of children with CLP have reported delay in both receptive and expressive language skills even in the absence of any concomitant hearing loss or mental retardation [10], [11], [12]. Children with CLP are also reported to use shorter mean length of response and poor structural complexity [13], [14]. In comparison to age matched TDC children with CLP are reported to be less verbal. They also tend to have poor vocabulary of comprehension as well as usage [15].

It has been reported by various studies that the difference in the language performance between children with CLP and TDC continued into school age and adolescent age and further into adulthood as well [16], [17], [18], [19], [20], [21], [22]. Due to the poor language skills, individuals with CLP tend to perform poorly during conversation, thus using language less effectively as a tool of communication.

Similar findings have been reported in few of the studies done in Indian context. Investigators conducted a retrospective study on 488 individuals with CLP [23]. The study attempted to investigate the speech language rehabilitation delivery model in India and measures to improve the same. Among the 488 individuals considered for the study, 100 were toddlers between the ages of 0 to 3 years. They reported that around 68% of the 100 toddlers considered exhibited delayed / inadequate expressive language skills and the remaining 32% had normal language skills. However, 32% of children were considered to be at risk of developing language deficits in future. They recommended implementation of early intervention program and parent guidance programs to prevent the same.

Further another study [24] investigated the conversation skills of ten Kannada speaking 5-6 year old children with CLP using Functional Analysis of Children's Classroom Talk [25] for qualitative analysis and Systematic Analysis of Language Transcripts [26] for quantitative analysis of language. The results revealed that the conversational skills of children with CLP lacked informativeness, interrogativeness, responsive labelling ability, organization, judgemental ability, argumental ability, repeatability of information and heuristic ability. Also quantitatively children with CLP had lesser total number of utterances, total complete words, mean length of utterances and number of different words. Thus the study revealed that linguistic skills of children with CLP were poor both qualitatively and quantitatively when compared to their peers.

An investigation was carried on the early language development and phonetic repertoire in native Tamil speaking children with unrepaired cleft lip and palate between the ages of 11 months to 18 months of age [27]. The study revealed that children with cleft had reduced number of utterances. Their utterances were comprised number of vowels as compared to consonants. The consonant repertoire was comparatively smaller in children with cleft. The authors concluded that as the children with CLP had difficulty in building adequate oral pressure for the production of consonants, they used simpler syllable structures (V, CV, and VCV) and less poly syllables.

Studies have reported that cultural differences have an effect on the language development as well as its progress in children [28]. India is a country with cultural and linguistic diversity. However, the studies which have explored the linguistic abilities of children with cleft in India are a handful. Thus the study was an attempt to study the linguistic abilities of children with CLP in Kannada, which is one among the various languages spoken in India. The study aimed at investigating linguistic performance of children with repaired cleft of lip and palate (RCLP) using a standardised language assessment test viz., Kannada Language Test (KLT) [29] and comparing the same with TDC.

Objectives

1. To investigate the semantic scores and syntactic scores 3-4 year old and of 4-5 year old TDC using KLT.
2. To investigate the semantic scores and syntactic scores of 3-4 year old and 4-5 year old children with RCLP using KLT.
3. To compare the KLT scores across age groups.

II. METHOD

A total of 20 children with RCLP, between the ages of 3–5 years were considered for the study. They were divided into two age groups viz., 3-4 years and 4-5 years respectively. Twenty age matched typically developing children were also considered for the study. They were also grouped according to the age into 3-4 year and 4-5 years. The demographic details of the children participating in the study is given in table 1. Children of RCLP were selected from Unit for Structural Oro-facial Anomalies (USOFA), Department of Clinical Services, All India Institute of Speech and Hearing, Mysuru and the St. Philomena Hospital, Bannimantap in Mysuru. All the children had undergone surgery between one to 1.5 years of age and none of them had attended speech therapy post-surgery. Children in the RCLP group did not present with any history of ear infections, hearing loss, upper respiratory tract infections, syndromes or intellectual deficits. Children belonging to TDC group were selected from preschools, Anganwadi and residential areas in Mysuru city. All of them passed the World Health Organisation (WHO) checklist before being considered for the study [30]. Parents of all children provided written consent before participating in the study. The study was conducted according to the ethical guidelines [31].

TABLE 1: Details of the children participating in the study

Groups	3-4 years				4-5 years			
	Female	Male	Total	Average age (years)	Female	Male	Total	Average age (years)
RCLP	6	4	10	3.5	7	3	10	4.7
TDC	5	5	10	3.3	7	3	10	4.5

Each child was seated comfortably in a quiet room. The Kannada Language Test (KLT) test was then administered.-KLT was developed as a part of UNICEF project in the year 1990 to test the language skills of Kannada speaking children between the ages of 3 to 7 years. Later it was KLT was revised and normative data was established for the same [29]. The test assesses receptive and expressive skills of both semantic and syntactic categories. Semantics category includes 12 sub-categories such as naming, semantic discrimination, lexical category, semantic similarity, semantic anomaly, semantic contiguity, paradigmatic relations, syntagmatic relations, polar questions, antonymy, synonymy and homonymy. Syntax category on the other hand includes 11 sub-categories such as morphophonemic structures, plurals, tenses, png markers, case markers, conditional clauses, transitives, intransitives and causatives, sentence types, conjunction and quotatives, comparatives and participial constructions. Breaks are given in-between test administration as per the temperament of the child. A correct response is given a score of '1', partially correct response is scored as '0.5' and incorrect responses is scored as '0'. Thus semantic and syntactic categories are tested for a score of 60 and 66 respectively. The scores thus obtained were computed according to the steps mentioned in the manual and later subjected to appropriate statistical analysis.

III. RESULTS

Semantic scores and syntactic scores of children with TDC across ages

The KLT results of 3-4 year old and 4-5 year old TDC groups were subjected to Shapiro-Wilk Test of normality. The test revealed that the scores of TDC group were normally distributed. Descriptive statistics of the same have been presented in table 2. Comparison among TDC groups revealed a developmental trend in the mean language scores. It was found that the mean language scores of 4-5 year old were higher than the 3-4 year old age group. Also the mean receptive scores were better than mean expressive scores in both semantic and syntactic category.

TABLE 2: Mean, SD and Median among TDC for Semantic Reception (SemR), Semantic Expression (SemE), Syntactic Reception (SyR) and Syntactic Expression (SyE).

	Age	Mean	SD	Median
SmR	3-4	22.20	2.32	22.50
	4-5	24.35	2.66	24.25
SmE	3-4	20.20	3.12	20.25
	4-5	22.45	2.65	22.25
SyR	3-4	24.70	2.93	24.25
	4-5	26.10	2.85	24.75
SyE	3-4	22.40	2.60	22.00
	4-5	24.50	3.17	23.50

As the TDC group was following normal distribution, one way repeated measure ANOVA was performed to compare semantic receptive (SmR) and semantic expressive (SmE) language skills with age as an independent factor. It was noted that there was significant difference between SmR and SmE in TDC group [$F(1,18) = 19.039$, $p < 0.01$, Partial Eta square = 0.514]. However there was no effect of age on SmR and SmE in TDC [$F(1,18) = 3.821$, $p > 0.05$, Partial Eta square = 0.175]. Also, there was no interaction effect noted between semantic language skills (SmR and SmE) and age [$F(1,18) = 0.013$, $p > 0.005$, Partial Eta square = 0.001].

Similarly, one way repeated measure ANOVA was performed to compare syntactic receptive (SyR) and syntactic expressive (SyE) language skills with age as an independent factor. It was noted that there was significant difference between SyR and SyE in TDC group [$F(1,18) = 16.011$, $p < 0.05$, Partial Eta square = 0.471]. However, there was no effect of age on SyR and SyE in TDC [$F(1,18) = 2.123$, $p > 0.05$, Partial Eta square = 0.106]. Also, there was no interaction effect noted between syntactic language skills (SyR and SyE) and age [$F(1,18) = 0.516$, $p > 0.05$, Partial Eta square = 0.028].

Semantic scores and syntactic scores of children with RCLP across ages

Shapiro-Wilk test of normality on KLT scores of 3-4 year old and 4-5 year old children with RCLP revealed that the scores did not follow normality. Descriptive statistics of the children with RCLP are depicted in the Table 3. It can be noted from Table 3 that similar to TDC groups, there was a developmental trend followed by the children of RCLP groups as well, wherein the mean language scores increased with the increase in the age. Also in the semantic and syntactic category, the mean receptive scores were better than the mean expressive scores.

TABLE 3: Mean, SD and Median among RCLP for Semantic Reception (SmR), Semantic Expression (SmE), Syntactic Reception (SyR) and Syntactic Expression (SyE).

	Age	Mean	SD	Median
SmR	3-4	14.50	3.51	13.75
	4-5	22.90	7.80	26.00
SmE	3-4	10.50	3.82	9.75
	4-5	20.50	8.50	23.25
SyR	3-4	17.05	3.80	16.00
	4-5	23.70	9.70	26.25
SyE	3-4	9.00	4.92	7.00
	4-5	20.35	9.33	23.75

Mann-Whitney U Test was performed on the data of RCLP group to statistically compare the means of SmR, SmE, SyR and SyE between age groups. Results revealed that there is no significant mean difference between age groups across semantic and syntactic language skills as depicted in Table 4.

TABLE 4: Mann-Whitney U Test for comparing the means of Semantic Reception (SmR), Semantic Expression (SmE), Syntactic Reception (SyR) and Syntactic Expression (SyE) across ages within RCLP group

	/z/	p value
SmR	2.34	0.01
SmE	2.38	0.01
SyR	2.23	0.02
SyE	2.65	0.00

Following this Wilcoxon Signed Ranks Test was carried out to compare the receptive and expressive scores under semantic and syntactic category respectively. Results of the same are depicted in table 5. The results revealed that there was a statistically significant difference present between semantic reception and semantic expression in both 3-4 year old and 4-5 year old RCLP groups. Similarly, the syntactic reception and syntactic expression statistically differed from each other in both 3-4 year old and 4-5 year old RCLP groups.

TABLE 5: Wilcoxon Signed Ranks Test to compare the means of receptive and expressive skills within semantic and syntactic language parameters in each age group

Age	Parameters	/z/	p value
3-4 RCLP	SmE - SmR	2.67	0.00
	SyE - SyR	2.80	0.00
4-5 RCLP	SmE - SmR	2.43	0.01
	SyE - SyR	2.80	0.00

Comparison of KLT scores across groups

Later Mann Whitney U test was performed to find out the significant difference within age groups as depicted in Table 6. The result revealed that there is significant difference between 3-4 RCLP group and 3-4 TDC groups; however no significant difference was noted across 4-5 RCLP and 4-5 TDC.

TABLE 6: Results of Mann Whitney U test within 3-4 and 4-5 age groups for Semantic Reception (SemR), Semantic Expression (SemE), Syntactic Reception (SyR) and Syntactic Expression (SyE),

Language skills	3-4		4-5	
	/z/	p-value	/z/	p-value
SmR	3.40	0.00	0.53	0.59
SmE	3.44	0.00	1.02	0.30
SyR	3.33	0.00	0.30	0.76
SyE	3.78	0.00	0.53	0.59

IV. DISCUSSION

The current study revealed three important findings. Firstly it was noted that children with RCLP performed poorly in KLT when compared to TDC group. Similar linguistic differences have been reported by previous studies as well [32], [33]. Multiple factors influence a child during acquisition of language. It was noted that the children in the RCLP group were not provided adequate feedback by their communication partners during conversations as their speech was not intelligible. In situations when the speech was partially intelligible, the adult communication partner focussed on correcting speech errors and very less attention was paid to correcting language errors. Children with RCLP had less practical language learning opportunity as well as the communication partners attempted less to initiate or maintain the conversations with the child due to poor speech intelligibility. Also as children with RCLP did not attend speech and language therapy resulting in poor linguistic skills in them. It was also observed that children with RCLP used gestures and sign more frequently to communicate with their communication partners specifically with parents along with few unintelligible utterances. Parents also indirectly promoted this for the ease of communication in children with RCLP as they did not mandate verbal communication in them. Cultural influence and also lack of knowledge about rehabilitation of children with RCLP could be possible reasons for the aforementioned observation. Similar observations have been reported by previous studies [34], [24]

Secondly, across age groups it was noted that among the 3-4 year olds, RCLP and TDC had significant linguistic skill difference however older age group did not show similar findings. Similar findings have been reported by previous studies [35]. Most of the children with RCLP in the current study attended “Anganwadi”¹ / preschool by the age of 2 years and above. Various developmentally appropriate pre-school activities are carried out at Anganwadi and preschools. Such a stimulating, enriching physical and psycho-social environment paved way for language development for older children with RCLP which otherwise would not have been provided at home or was inadequate for 3-4 year old RCLP children attending Anganwadi / preschool. Also the parents were educated about child growth and developmental milestones and their significance by Anganwadi workers and preschool teachers. The parents were thus able to identify the delay in the speech and language skills of their children with RCLP. Therefore, they consciously put in more effort and used strategies to improve language skills in their child. This again promotes language development in 4-5 year old children with RCLP.

Thirdly, the semantic and syntactic receptive scores were better than the semantic and syntactic expressive scores in both RCLP and TDC groups. The children with RCLP in the present study had varying degree of cleft. Therefore post-surgery the oral structural integrity may also have varied. Also there are studies which have reported poor cognitive abilities in children with RCLP [12], [36]. These factors along with age of surgery, type of surgery, restricted consonant inventory, severity of hypernasality, not availing speech-language rehabilitation post-surgery would have led to poor semantic and syntactic expressive skills. Similar findings have been reported by previous studies [33], [37], [38], [39], [40]. It has been reported that factors such as also auditory attention, concentration and memory play a crucial role in language acquisition [41]. However it was observed during investigation of the present study that children with RCLP

¹ “Anganwadi” provides early childhood care to children between 1 to 5 years of age along with other health care services. It is an initiative by the Indian government aimed at empowering women by enabling them to undertake paid work during the day by leaving the children at such a centre.

lacked auditory attention, concentration and memory in varying proportions. It can therefore be speculated that these observed behaviours could also have resulted in poor language skills in children with RCLP compared to TDC. Further studies need to be done to investigate the same.

V. CONCLUSION

The current study was aimed at investigating linguistic performance of children with RCLP using Kannada Language Test [29] and comparing the same with TDC. It was revealed that overall children with RCLP had poor language scores compared to TDC. It was noted that there was a developmental trend in the language scores in both TDC and RCLP groups. That is, the 4-5 year old children of both TDC and RCLP groups had higher language scores compared to the corresponding younger 3-4 year old groups. Further, there was significant language difference between RCLP and TDC only within 3-4 year old groups. However, no such difference was noted in the 4-5 year age groups. Finally, it was revealed in the study that the semantic and syntactic receptive skills were better than the respective expressive skills in both RCLP and TDC groups. Thus, use of standardized language assessment in children with RCLP helps in identifying language deficits and planning rehabilitation as well as documenting the progress of therapy as time progresses.

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