

**LANGUAGE SKILLS IN 7 – 10 YEAR CHILDREN
WITH REPAIRED CLEFT LIP AND PALATE**

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Register No.: 16SLP029

**This dissertation submitted as a part fulfillment for the
Degree of Masters of Science
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APRIL, 2018

CERTIFICATE

This is to certify that the dissertation entitled “**Language Skills in 7 – 10 year Children with Repaired Cleft Lip and Palate**” is a bonafide work submitted in part fulfillment for the degree of Master of Science (Speech-Language Pathology) of the student (Registration Number: 16SLP029). This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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CERTIFICATE

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DECLARATION

This is to certify that this dissertation entitled “**Language Skills in 7 – 10 year Children with Repaired Cleft Lip and Palate**” is the result of my own study under the guidance of Dr. M. Pushpavathi, Professor in Speech Pathology, All India Institute of Speech and Hearing, Mysuru, and has not submitted earlier in any other University for the award of any Diploma or Degree.

Mysuru
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“ಪ್ರೀತಿಸುತ್ತಾ ಬಳಸಿ, ಉಳಿಸುತ್ತಾ ಬೆಳೆಸಿ”

ಜೈ ಕರ್ನಾಟಕ

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CHAPTER 1

INTRODUCTION

Cleft Lip and Palate (CLP) is a congenital abnormality of the face and oral cavity that occurs during the first trimester of pregnancy which hinders the effective communication in early childhood due to associated speech and language disorders (Kummer, 2008).

The birth rate of CLP in India is reported to be 1.09 for every 1000 live births (Srinivas, 2001). Mossey (2009) estimated out of 24.5 million births per year in India, the birth prevalence of clefts is somewhere between 27,000 and 33,000 clefts per year. In 2011, International Peri-natal Database of Typical Oral Clefts (IPDTC) revealed an overall prevalence of cleft lip with or without cleft palate was 9.92 per 10,000. The prevalence of cleft lip was 3.28 per 10,000 and that of cleft lip and palate was 6.64 per 10,000. Another statistical survey by Times of India reported that the incidence of CLP has risen to 7 per 1,000 children (Shrivatsav, 2013).

The communication disorders in CLP are inter-related with many causative factors, which are with respect to cleft type/severity, associated syndromes, age at which palate repair was done and its efficiency, unrepaired residual cleft, presence of fistula, status of velopharyngeal function, hearing status, amount and efficacy of communication interventions and socioeconomic status of the family. The cause - effect relationship has found that genetic or environmental factors are mostly responsible for cleft in children, resulting in a heterogeneous population (D'Antonio and Scherer, 2008).

Individuals with cleft lip and palate often demonstrate multiple associated problems such as early feeding difficulties, nutritional issues, developmental delays, abnormal speech and / or resonance, facial and orthodontic abnormalities, hearing loss and possibly, psychosocial issues and learning disability. But with respect to communication difficulties children with CLP's speech and language skills are majorly focused.

Research over the last two decades have highlighted that, even with early surgical repair a majority of school aged children with CLP demonstrate limited sound inventory, atypical consonant productions, hyper nasality, nasal air emission, altered laryngeal voice quality, nasal or facial grimaces, compensatory articulation and reduced speech intelligibility (Sunitha, 2004; D'Antonio, 2008).

Delay in expressive language or the inherent anatomical deficit is known to cause phonological disorder in children with RCLP (Morris, 1962; Chapman, 1993). Children with repaired cleft lip and palate (RCLP) has a greater number of phonological processes than the typically developing children due to the fact that children with RCLP are known to be at risk for phonetic and phonological disorders (Bzoch, 1956; Bzoch, 1965; Van Demark, Morris, & Vandehaar, 1979).

Children with cleft can experience “delayed or disordered acquisition of phonological processes with abnormal development of the sound system of language and the rules that govern sound combinations” (Royal College of Speech and Language Therapists, 2009).

Falzone, Hardin-Jones and Karnell (2010) reported that at least twenty-five percent of children with cleft can be expected to experience normal speech and language development without any intervention yet for the remaining seventy-five

percent issues can occur. Language is the area that appears to have the greatest influence on learning and which threads through the learning trajectories of individual children with RCLP (Giffen, 2017).

There is also evidence of delays in expressive language, acquiring phonetic and phonological speech production, and higher-level of language like semantic, morpho-syntax, in addition to literacy problems in later childhood (Morris & Ozanne, 2003). This indicates that even in children with RCLP also has some amount of lexical and syntactic processing skills are poor.

During the developmental phase of speech and language, school aged children with RCLP demonstrate features such as reduced mean length of utterance (MLU), reduced lexical diversity, smaller phonetic inventory and also a variety of deviant phonological processes and construct sentences having less complex syntactic structure and will have confusion to recognize the syntax errors (Kommers and Sullivan, 1979). However, early deficits in receptive and expressive language appear to persist even in 8 years old children and older (Morris, 1962). But these errors in expressive language skills disappear over school aged period (McWilliams, Morris, & Shelton, 1990 and Chapman, 2006).

Studies and reviews carried out in recent times have reported that children with CLP obtain considerably poorer scores in the language domain especially in expressive abilities, when compared to their typically developing peer groups. This underlines the fact that focus should also be brought to improve linguistic skills during the early stages of intervention in children with CLP.

School aged children with RCLP are the one having less number of associated problems since their early intervention is progressed and probably having more of

difficulties in speech and language skills. Such multiple associated problems need to be dealt by a team of experts from birth to 18 years of age.

Need for the present study:

There are inconsistencies in the literature regarding the presence of receptive and expressive language delays and their severity in case of school aged children with RCLP. Hence it is important that SLP's who work with this population should be aware of the possibility of speech and language impairments which in turn helps in better assessment and rehabilitation.

Also, most of the studies try to explain the language skills of pre-school and school age children with CLP using few of language tools like TOLD, CELF, etc on comparison to the typical group, where as in Indian context there are relatively very less studies have tried to explain the language skills of school age children with RCLP using Indian standardized language tools. This necessitates the need for the current study in investigating the language characteristics of school age children with RCLP in Kannada language and to compare with age and gender matched typically developing children.

CHAPTER 2

REVIEW OF LITERATURE

Communication is made up of several components including hearing, receptive language, expressive language, speech, resonance, voice and the social use of language referred to as pragmatic skills. In case of individual with cleft lip and/or palate, any one or combination of these communication areas can associate abnormalities.

2.1. Language

Language is a complex and dynamic system of conventional symbols that is used in various modes for thought and communication. Contemporary views of human language hold that language evolves within specific historical, social, and cultural contexts. Language, as rule-governed behavior, is described by at least five parameters - phonologic, morphologic, syntactic, semantic, and pragmatic. Language learning and use are determined by the interaction of biological, cognitive, psychosocial, and environmental factors. The effective use of language for communication requires a broad understanding of human interaction including such associated factors as nonverbal cues, motivation, and socio-cultural roles. (American Speech and Hearing Association, 1982)

Researchers have been interested in examining the language skills of children with CLP since from 2000. These studies focused more on speech and language skills of toddlers and preschool children with CLP. Researchers were also interested in describing more speech skills than the language skills of children with CLP post-palatal surgery. The typical methodology for these language studies included comparing a group of children of various cleft types to a similar-aged group of non-

cleft children or comparing their performance to standardized test norms. There was further detailed language analysis was carried out because most of the studies were reporting intact language acquisition and develops as age increases in children with CLP. As a result, the researchers turned their attention to other lines of investigation. The cause of these language delays was attributed to certain variables such as poor hearing, frequent hospitalizations, deviant speech and language skills, socio-cultural variables, psychological issues and low cognitive ability.

2.2. Phonology

The phonological processes that are typical of children with clefts include final consonant deletion, syllable reduction, stridency deletion, cluster reduction, backing, nasal assimilation, velar assimilation, nasalization, glottal replacement, stopping, and deaffrication (D'Antonio & Scherer, 2008; Morris & Ozanne, 2003).

2.3. Semantics

Children with RCLP exhibit semantic deficits of language function (e.g., verbal reasoning, categorization, abstract reasoning and use of verbal mediation for problem solving, rapid naming and auditory sequential memory) and few lexical processing skills like antonym, homonymy and semantic analogy, lexical naming and differentiation (Richman and Lindgren, 2006).

2.4. Syntax

School aged children with RCLP demonstrate features such as reduced mean length of utterance (MLU), reduced lexical diversity, smaller phonetic inventory and also a variety of deviant phonological processes and construct sentences having less complex syntactic structure and will have confusion to recognize the syntax errors (Kommers and Sullivan, 1979). Recent authors reported that these errors in

expressive language skills disappear later (McWilliams, Morris, & Shelton, 1990 and Chapman, 2006).

In earlier cognitive research, Conrad, (1964) had suggested there exists a phonological similarity effect by which remembering a series of words which are phonologically similar is much harder than those that are dissimilar. Another issue is that of word length whereby as the word length increases it takes longer to remember the word.

Receptive and expressive language scores of children with cleft lip and palate were considered to be delayed when compared to both in their chronological age and to their peers with non-cleft. However, when tested in 6-month intervals as a follow up, children with cleft lip and palate demonstrated progressively higher receptive and expressive language scores, but they were still below the expected norms for their chronological age (Philips & Harrison, 1969). This study indicates that there is a better performance of language skills across child's chronological age which is linear to typically development children's language skills but its deviant in time of language acquisition. Hence the language acquisition and the disorder vary across age and traditional languages.

2.5. Toddlers

Studies have identified delay in receptive language skills for toddlers with CLP and both implicated hearing as a possible contributing factor (Boren, 1998). Also found that toddlers with CLP only exhibited a 3-month delay in acquisition of words compared to toddlers with non-cleft at 15, 18, and 21 months. Toddlers with CLP exhibit more of expressive language and phonological delay in addition to any structural-based problems (Morris and Ozanne, 2003).

Recent studies of early language development in children with cleft lip and/or cleft palate indicate that they show a delay in onset of first word and early expressive vocabulary development. Some children with cleft lip and palate experience delay in both receptive and expressive language skills. Some children with CLP may have vulnerability in receptive language development that warrants monitoring (Kristina Wilson & Chapel Hill, 2007).

In contrast to the previous studies Chapman and colleagues (2006) administered the age-appropriate version of the Test of Language Development (TOLD) to a group of 5- 6 year old (TOLD-P: 3) and a group of 7-9 year old with CLP (TOLD-P: 2 and TOLD-I: 2). Testing the receptive and expressive language of the two different age range groups, they found that the children with CLP to be similar to their age-matched peers, with standard scores for the cleft group, specifically receptive and expressive vocabulary. The results were found to be similar to a group of non-cleft peers at 5 and 7 years of age.

2.6. Preschool Age

Some studies have found that vocabulary and syntactic delays present in young children with clefts and persist into school-age years. Other researchers report that vocabulary delays resolved by the time the subjects reached school age or were not present at all.

Spriestersbach, Darley, and Morris (1958) found that while the children with clefts in their sample ages 3 ½ years to 8 ½ years had good receptive vocabulary skills as well as grammatical skills that resembled normative data, their expressive vocabulary skills were below average.

A study by Philips and Harrison (1969) aimed to compare the language skills of

children with cleft age ranged from 18 to 72 months, found that children with clefts performed significantly different from typical group on measures of receptive and expressive language.

Vocabulary skills was examined by Nation's (1970) in preschool children with clefts, noted that children with clefts had delayed vocabulary skills when compared to their siblings as well as in comparison to the normative data available on the assessment used in the study. They also found that the overall delay in both receptive and expressive vocabulary which indicated more significant deficits in terms of expressive vocabulary.

With presence of compensatory speech errors in 3 to 8 year old children with cleft Pamplona, Ysunza, Gonzalez, Ramirez, & Patino (2000) identified that there was a decrease in expressive language skills when compared to other children with clefts who did not have speech errors, while other studies indicate no differences with control groups in terms of their language skills (Chapman, 2011; Collett, 2010).

Preschool children with cleft lip and palate had significantly smaller vocabularies and shorter mean length utterances than children without cleft lip and palate. Lowe and Scherer (2003) indentified that 5-year-old children with cleft lip palate had deficits in some traditional language, such as vocabulary and syntax comprehension.

Another study reported receptive language skills within the normal range, but with varying expressive skills, with some children demonstrating delay and others showing typical language development (Hardin-Jones & Chapman, 2011).

2.7. School age

During the school age period, language impairment may be disguised as an educational impairment. The strong relationship between language performance and school achievement is well known for children with other disabilities but has not received much attention in children with cleft palate. Many of the early studies of language performance describe general language delay that includes receptive, expressive, and written language modalities extending into adolescence.

However, more recent studies suggest that there may be subgroups of children within the cleft population who exhibit different profiles of language performance through school age. One subgroup of children appears to show a general language disability (Richman and Ryan, 2004). These children show deficits that include broad areas of language function (e.g., verbal reasoning, categorization, abstract reasoning, use of verbal mediation for problem solving, rapid naming and auditory sequential memory). This general language disability profile was observed more in males with isolated cleft palate than in children with other cleft types.

A second sub group includes children with expressive language deficits. These children show deficits in rapid naming and auditory memory but not verbal mediation and abstract reasoning. This expressive language group included primarily children with cleft lip and palate. These two language profiles also exhibit different degrees of risk for academic difficulties. (Richman, Ryan and Lindgren, 2004). The children with general language disability show the greatest risk of reading and math deficits. Whereas the occurrence of reading disability in the non-cleft population runs between 10 and 15%, children with clefts show a 30–40% occurrence (Richman and Ryan, 2003).

The persistence of language impairment in some children with cleft palate and the impact of unrecognized impairments on the child's education success indicate that language performance should be assessed thoroughly for those children with poor school performance.

There are certain studies which basically concentrate on analyzing the language skills and acquisition in school age children with repaired cleft lip and palate.

Many of the language problems actually exhibited by children with compensatory articulation disorder (CAD) may be overlooked when the speech disorder is viewed from a phonetic rather than a phonological perspective with regard to this, Pamplona (2000) investigated the possible relationship between CAD and the child's language system, including the ability to use semantic, syntactic, and discourse elements of language rules to express meaning, in children with repaired cleft palate. Subjects were selected with age ranges from 3 to 8 years of children with repaired cleft palate with residual velopharyngeal insufficiency (VPI), with and without CAD. Totally, fifty four participants were considered and divided into two groups, first group (active) consisted of twenty-nine children with cleft palate with residual VPI with CAD and the second group was assembled with 29 children with repaired cleft palate with residual VPI without CAD, matched by age and gender. To check language skills, samples were elicited through two naturalistic conditions (story narration and play activity). In story narration task, all the subjects were presented with action picture showing a family engaged in everyday activities such as cooking, playing hide-and-seek, and doing laundry, selected from a picture set, children were asked to look at the picture and narrate a story. Whereas in play activity, a miniature play house with a wide array of people, furniture, food items, and other props were

used and the child were allowed to play spontaneously, during this time the examiner asked questions about the actions done by the child. All the interactions were audio-video recorded for later transcription and analysis. The language samples were analyzed using the Situational–Discourse–Semantic (SDS) model. This model is a valuable tool for conducting naturalistic observation and descriptive assessment of language development, which provides a detailed description of three contexts (situational, discourse, and semantic) in ten levels of cognitive and linguistic organization. The child’s profile for the Situational, Discourse, and Semantic aspects of language were scored by subtracting the assigned level obtained from the assessment from the expected level established by the SDS age norms and were compared statistically for differences between the experimental and control groups. Results showed that Children with CAD were significantly different from those without CAD on all three measures of language. All patients with CAD showed linguistic organization below the expected level according to chronological age and increased levels of delay were observed in the semantic context. This could be because children with linguistic organization problems have difficulty deriving meaning at more abstract semantic levels (Damico, 1992). In conclusion, that a detailed evaluation of all aspects of cognitive and linguistic organization should be performed in individuals with cleft palate , especially in children with VPI along with CA and should address not only the articulation process, but also specific aspects of language development.

Information about the conversational skills of children with cleft lip and/or palate is important to overall communicative functioning. Chapman, K. L., Hardin-Jones, M., & Halter, K. (2006) aimed at examining the conversational skills of preschool and school-aged children with cleft lip and palate. Twenty children with

unilateral cleft lip and palate (10 preschoolers of 3.7 – 4.9 years and 10 school-age children of 7.6 – 9.6 years) were considered for the study with age, gender, and socioeconomic status matched peers. Child and examiner were engaged in spontaneous joint play activity with age-appropriate toys (e.g., play house, toy hospital scene, kitchen set, transportation scene, etc.) and in spontaneous conversation (concerning topics such as school, favorite activities, favorite television programs, family vacations, etc.) for approximately 30 minutes and the samples were audio-video recorded. Separate comparisons were made for the preschool children with CLP and their non-cleft peers. Also the school-age children with CLP and their non-cleft peers were assessed on various standardized measures of speech (Goldman-Fristoe Test of Articulation; Templin-Darley Tests of Articulation) and language (Battelle Developmental Inventories; Test of Language Development-2 P/I) using eight measures of conversational assertiveness/responsiveness and the standardized tests of pragmatics using Test of Pragmatics. Results on language performance showed that, there was a significant difference between the CLP of both age groups and with their peer groups in receptive sub-test of BDI but no significant difference in expressive sub-test of BDI, also the conversational responsiveness scores were similar to that of their non-cleft peer group. Further, when comparing these children individually, results revealed that 50% of the preschool children and 20% of the school-age children were passive conversationalists who also exhibited lower performance in language tests. This was because; the utterance length of school-age children with cleft lip and palate was reported to be shorter than those of normative sample utterance. Limitation of this study was that the children participated had fairly good speech, resonance, and language skills which limits the generalization of the findings to children with similar speech and language profiles. This shows that language is also

one of the major components for development of conversational skills in school age children.

Assessment of meta-linguistic skills in children with cleft lip and palate is critical to proper patient care since these skills are related to academic achievement and second language learning. (Lierde, 2014) to assess the specific meta-linguistic awareness of homonymy in children with cleft lip and palate at the age when children start to learn a second language, as well as their overall expressive and receptive language abilities comparing with normative data. The study included 13 children with RCLP with early surgical intervention below 13 months of age, where four children are of repaired bilateral cleft lip and palate and 9 are of repaired unilateral cleft lip and palate. All the subjects were between 10 to 12 years of age having 4th, 5th and 6th grade education in elementary school. The original homonym mastery test used by “Corthals - Nine-to twelve year olds’ meta-linguistic awareness of homonymy” was used to assess meta-linguistic skills, which consists of 60 items (21 words having only one literal meaning, 19 homonyms and 20 pseudo-words). The task was to assign each word to one of three possible categories: a no literal meaning category, a category of words having just one literal meaning, meaning and finally, a category of words having more than one literal meaning. The final score was determined on the basis of 20 specific items that were chosen from the original set of 60 after an item analysis, using their item-total correlation and their discriminating power as criteria. All 60 items were presented at a constant pace of one per 10 seconds. The final scores were transformed to percentile ranks, using data from typically developing children with the appropriate age and gender in the Corthals. Overall expressive and receptive language development level was tested using the Taaltestvoor Kinderen (Van Bon W, 1982) a Dutch language battery designed for

children between 4 and 10 years of age that assesses sentence comprehension, sentence expression, word comprehension, word expression and inferential understanding. Descriptive statistics was used to describe the language results regarding meta-linguistics, word and sentence expression/comprehension. Results showed that there was no significant difference between scores of the children with cleft palate c and those of the matched control group in both Corthals test and Taaltestvoor Kinderen test. Only one child had lower scores in homonymy and in sentence comprehension. This could be due to children with cleft palate patients typically receive speech therapy from an early age, which all depending on the individual patients' profile. The findings suggest that early assessment and treatment of specific meta-linguistic awareness (together with word and sentence expression and reception and interferential skills) in children with cleft palate may help to prevent delays or learning difficulties in some children during the final grades of regular elementary school.

There are several risk factors including hearing difficulties, lack of language stimulation, and parents' low level of expectation leading to language disorders in children with cleft palate. With regard to this Anaraki, Faham, Derakhshandeh, Hosseinabad, & Haresabadi (2017) aimed at evaluating proficiency in language parameters (including semantics, syntax, spoken language, listening, and organization) of Persian-speaking children with unilateral and bilateral CLP, in order to develop a language profile and to explore the possible relationship between different parameters of the language. Author has considered sixteen, 4 -7 year old Persian-speaking children with unilateral and bilateral repaired cleft lip and palate, where palatal surgery was done before 18 months of age. Each child was assessed with Test of Language Development-Primary, third edition (TOLD-P3) which is

standardized to 4 to 8.11 years of age and analyzes the “linguistic features” and “linguistic systems”. Linguistic features like semantics, syntax and phonology, and linguistic systems like listening (receptive skills), organizing (integrating-mediating skills), and speaking (expressive skills). Results showed that the percentage of children with CLP in different categories of TOLD-P3 (semantic: 18%, syntax: 12%, spoken language: 31%, listening: 25%, organization: 37%, speaking: 31%) were lower than those obtained by typically developing children (49.51%). On comparison the scores obtained from children with CLP were significantly different from normative data in all categories of language performance ($p < 0.001$). In further, studying the correlation of different language composites showed that all composites are significantly correlated except listening (picture vocabulary and grammatical understanding) and speaking (oral vocabulary and grammatical completion). This is because children with cleft have physical limitations that result in restrictions of early sound systems, which can in turn lead to reduced early word acquisition which indicates that, deficiency in one component may show weakness in other components. Also highlight that time of surgery could not play an effective role to prevent language deficiencies of the children as all of studied subjects had undergone surgery before 18 months proving heterogeneity of population.

The assessment of language has to be done in the native language of children with cleft palate. Several studies reported in this section highlights the studies explored the linguistic abilities in western context. There are limited studies in Indian context. The results obtained in other languages cannot be generalized to Indian languages as the structure of the language differs. The present study aims to investigate the linguistic abilities in children with RCLP in Kannada language. Kannada belongs to the south Dravidian family of languages. Kannada morphology is

characterized as agglutinative, i.e., words are formed by adding suffixes to the root word in a series. The orders in which suffixes attach to a root word determine the morpho-syntax. The complexity of developing morphological analyzer for Dravidian language like Kannada is comparatively higher than the other languages like English. There are three types of Kannada words. Nouns, pronouns and adjectives belong to declinable words and are inflected to differences of case, number and gender. Conjugable words are inflected to mark differences of person, gender, number, aspect, mood and tense. All the Kannada words are of three genders: masculine, feminine and neuter. The morphological structure of Kannada is more complex because it inflects to person, gender, and number markings. Phonology also plays a little role in word formation in terms of „morphophonemic“ and „sandhi“ rules which account for the shape changes due to inflection (Ramasami Veerappan, 2011).

With regard to the structural variation in native languages it is important to understand these linguistic features of native Kannada language learnt or used by the children with RCLP, where they are not exposure to any language therapy for more than a month. So the present study aims to investigate these features in children with RCLP and compare them with their typical peer groups.

Aim of the Study:

To investigate the language skills of primary school age children with repaired cleft lip and palate (RCLP) and to compare it with typically developing children (TDC) using Linguistic Profile Test (LPT-K; Suchithra & Karanth, 1990).

Purpose of the study:

- It can help in understanding linguistic skills of children with RCLP.
- It can help in the choice of treatment goals for speech-language pathologists.

- It can help in documenting research as supporting or updating study.

Objectives of the study:

- To investigate phonological abilities of children with RCLP and to compare it with TDC.
- To investigate semantic abilities of children with RCLP and compare it with TDC.
- To investigate syntactic abilities of children with RCLP and compare it with TDC.
- To evaluate overall language skills of children with RCLP and compare it with TDC.

CHAPTER 3

METHOD

The purpose of the current study was to profile the language skills in 7 – 10 year children with Repaired Cleft Lip and Palate using the Linguistic Profile Test (LPT) and following procedure was adopted to investigate the objectives.

3.1. Participants

The present study consists of two groups of native Kannada speaking children between the age ranges of 7 – 10 years. Group A consisted of children with RCLP and Group B consisted of age and gender matched typically developing children (TDC).

Group A consisted of 15 children with RCLP and was sub divided into 5 children in each age range of 7 – <8 years (mean age 7.4 years), 8 – <9 years (mean age 8.6 years) and 9 – <10 years (mean age 9.5 years). These children were selected from the Department of Clinical Services, AIISH, Mysuru, who had availed OPD services. Parents of children with RCLP were explained about the purpose of the study and an informed written consent was taken. All these children were selected based on meeting certain following,

Inclusion criteria,

- Children with Non-Syndromic repaired cleft lip and palate;
- Children with normal intelligence;
- Children who have not availed language therapy for more than a month after surgery

Exclusion criteria,

- Children with the history of any neurological speech disorders;
- Children with any other associated syndromes;

- Children with unrepaired cleft lip and palate,
- Children who have availed language therapy for more than a month after surgery,
- Children with Sub-mucous cleft palate (SMCP),
- Children with or without repaired cleft of lip alone.
- Children with history of frequent ear discharge, hearing loss, upper respiratory tract infections (URTI);

The demographic details of the participants according to age, gender, cleft type, SES (Singh, Sharma, & Nagesh, 2017) and education status is depicted in Table 2.1

Table 2.1

Demographic details of the participants of Group A

Group A	Age (years)	Gen der	Education (Std)	SES	Cleft type
RCLP 1	7.2	F	II	LMC	Repaired Bilateral Cleft Lip and Palate
RCLP 2	7.3	M	III	MC	Repaired Unilateral Cleft Lip and Palate
RCLP 3	7.6	M	II	MC	Repaired Unilateral Cleft Lip and Palate
RCLP 4	7.8	F	II	MC	Repaired Unilateral Cleft Lip and Palate
RCLP 5	7.11	M	II	LMC	Repaired Bilateral Cleft Lip and Palate
RCLP 6	8.1	M	III	MC	Repaired Unilateral Cleft Lip and Palate
RCLP 7	8.2	M	III	MC	Repaired Bilateral Cleft Lip and Palate
RCLP 8	8.6	M	IV	MC	Repaired Unilateral Cleft Lip and Palate
RCLP 9	8.8	M	III	LMC	Repaired Unilateral Cleft Lip and Palate
RCLP 10	8.11	F	III	MC	Repaired Bilateral Cleft Lip and Palate
RCLP 11	9.2	M	IV	MC	Repaired Unilateral Cleft Lip and Palate
RCLP 12	9.4	F	IV	LMC	Repaired Unilateral Cleft Lip and Palate
RCLP 13	9.8	M	V	UMC	Repaired Unilateral Cleft Lip and Palate

RCLP 14	9.10	M	IV	LMC	Repaired Bilateral Cleft Lip and Palate
RCLP 15	9.11	M	IV	MC	Repaired Unilateral Cleft Lip and Palate

Note: M - Male; F - Female; SES – Socioeconomic Status Scale; UMC – Upper Middle Class; MC – Middle Class; LMC – Lower Middle Class

Group B consisted of totally 30 typically developing children (TDC) and were sub divided into 10 children in each age range of 7 – <8 years (mean age 7.4 years), 8 – <9 years (8.5 years) and 9 – <10 years (mean age 9.3 years). These children were selected from nearby schools around the campus and also from local areas. The investigator had obtained the respective schools principal’s permission to carry out the study on primary school children in their leisure class hours and consent was taken from the parents of the children recruited from local areas. All these children were selected based on meeting certain following,

Inclusion criteria

- Children passing informal screening for speech-language and hearing disorders;
- Children ruled out for different types of disability by administering World Health Organization (WHO) checklist (Singhi, Kumar, Malhi and Kumar, 2007);
- Children with normal intelligence;

Exclusion criteria,

- Children with the history of any speech and language disorders or any other disorders;
- Children with history of frequent ear discharge and hearing loss, children with any medical issues;
- Children failing in screening tests.

The demographic details of the participants according to age, gender, SES and education status is depicted in Table 2.2.

Table 2.2

Demographic details of the participants of Group B

Group B	Age (years)	Gender	Edu (Std)	SES	Group B	Age (years)	Gender	Edu (Std)	SES
TDC 1	7.2	M	II	LMC	TDC 16	8.5	M	III	MC
TDC 2	7.3	M	II	MC	TDC 17	8.6	F	IV	MC
TDC 3	7.6	F	II	MC	TDC 18	8.6	M	III	LMC
TDC 4	7.6	F	II	MC	TDC 19	8.7	M	III	MC
TDC 5	7.7	F	II	MC	TDC 20	8.11	M	III	LMC
TDC 6	7.7	M	II	LMC	TDC 21	9.1	M	IV	MC
TDC 7	7.8	F	II	UMC	TDC 22	9.1	M	IV	UMC
TDC 8	7.10	M	III	MC	TDC 23	9.3	F	IV	LMC
TDC 9	7.11	F	II	LMC	TDC 24	9.4	M	IV	MC
TDC 10	7.12	M	II	LMC	TDC 25	9.6	M	IV	MC
TDC 11	8.1	M	III	LMC	TDC 26	9.8	F	IV	MC
TDC 12	8.1	M	III	MC	TDC 27	9.9	F	IV	MC
TDC 13	8.2	M	III	MC	TDC 28	9.10	F	IV	MC
TDC 14	8.2	M	III	MC	TDC 29	9.10	F	IV	MC
TDC 15	8.5	M	III	MC	TDC 30	9.11	M	IV	MC

Note: M - Male; F - Female; SES – Socioeconomic Status Scale; UMC – Upper Middle Class; MC – Middle Class; LMC – Lower Middle Class

3.2. Material

To analyze and profile the linguistic skills of the children the Linguistic Profile Test in Kannada (LPT - K) (Suchithra & Karanth, 1990) was used.

This test basically measures individual's receptive and expressive language skills in 3 sections, in the age range of 6 to 15 years. Section I tests Phonology, Section II tests Syntax, Section III tests Semantic and Discourse is the tail end of the test. For the current study, only the sections I II & III was considered, to examine the language skills of children.

Phonological section contains 3 domains with 30 test items; it includes phonemic discrimination, phonetic expression and running speech. Semantic section contains 12 domains with 66 test items; it includes categories like naming, semantic discrimination, lexical categories, similarity, semantic anomaly, semantic contiguity, paradigmatic relations, syntagmatic relations, polar questions, antonym, synonymy, and homonymy. Syntax section contains 11 domains which consist of 60 test items; it includes morphophonemic structure, plurals, tenses, P.N.G. markers, case markers, conditional clauses, transitive/ intransitive/ causative, sentence type, conjunctive and quotative, comparatives and participle constructions.

Since there are no scoring for discourse and running speech domains these were not considered for the analysis and rest all the domains were considered. This test took approximately 90 minutes of time duration for administration. If the child was not cooperative then child was given reinforcement to increase the motivation and a break was given when the child lost the interest in the test. The scoring sheet for each domain is attached in Appendix A.

3.3. Procedure

Pediatric database of children maintained in Unit of Structural and Oro-Facial Anomalies (USOFA) unit at Department of Clinical Service (DCS), AIISH was reviewed for collecting the details of participants. Case files were accessed from registration contour and were separately analyzed in detail for their demographic information, information about assessment details, the date of evaluation, patients age at the time of evaluation, surgical details and duration of speech-language therapy attended information were collected. Children fitting the inclusion criteria were listed down with available information. Based on details obtained, children with RCLP were contacted via mail and/or over phone to participate in the study. Parents of children who agreed to participate in the study were briefed about the methodology and its implications to their child and to other children and a written consent sign (Appendix B) was taken before proceeding further.

During testing child was made to sit comfortably on a chair within a room with minimal distractions and a Handy cam recorder (Sony DCR-SR88) was placed at a distance of one meter away from the child's face, for the purpose of audio visual recording.

Each child was administered on pre-decided 3 sections of LPT individually according to procedure given in LPT and scoring was done simultaneously in the LPT scoring sheet as mentioned in the booklet. Break was given as per the temperament of each child. The raw scores on language skills of children obtained were tabulated for further analysis. Each recording was done for an approximate duration of 50-60 minutes when the child was co-operative. In instances wherein the child was not co-operative various strategies such as a few trial recordings were carried out or giving

breaks in between sessions were done or reinforcements were provided to pay attention towards the tasks.

Children with RCLP's speech were characterized with hyper nasality and misarticulation with compensatory articulation and unintelligible speech. This lead difficulty to understand the response of some of children with RCLP. So in those cases the children with RCLP were asked to write or gesture the response. The recorded samples were also subjected to intra judge and inter judge reliability measures to elicit and score the responses of children with RCLP. The present followed a standard two group comparison research design to compare the linguistic skills between Group A and Group B.

3.4. Inter-judge and Intra judge Reliability

For inter judge reliability, two well experienced Speech Language Pathologists (SLP's) who had one year of experience in analyzing the speech sample of children with CLP were considered . Considering the sample size, 25% and 75% (Group1 and Group 2 respectively) of samples recording was subjected to judging the responses. These samples were chosen randomly and their related audio-video samples were given to experience SLP's for rating. Instructions were provided related to the objectives of the study and procedure implied in investigating and LPT-K scoring sheet was provided to score the response of the children.

Similarly, for intra judge reliability the random samples were reanalyzed after two months from the date of first analysis to check for the reliability. The average mean value was calculated separately for the perceptual judgment and the percentage of reliability was calculated. A follow up was also recommended in case of any issues in children with RCLP for further clinical services.

3.5. Data analysis:

The scores obtained in each of the domains were computed and tabulated. The data was then subjected to descriptive and inferential statistics and results were represented in the form of tables. Cronbach's alpha coefficient was utilized for analysis of inter and intra-judge reliability of the scores. Qualitative analysis of the data was also carried out to determine the pattern of errors in both the groups of subjects. The results of the analysis are presented and discussed in the sections that follow.

The data obtained from both the groups was tabulated and analyzed using SPSS software version 20. The following statistical analysis was carried out:

- Cronbach's alpha test was obtained for determining the test-retest reliability
- Shapiro-Wilk Test to check the normality of the data.
- Descriptive statistics was carried out for all the parameters of language.
- Mann-Whitney U Test to check the comparison between children with RCLP (Group A) and TDC (Group B).
- Mann-Whitney U Test to check the comparison between children with RCLP (Group A) and TDC (Group B) across age range.

CHAPTER 4

RESULTS AND DISCUSSION

The aim of the current study was to investigate the language skills of primary school age children with repaired cleft lip and palate (RCLP) – Group A and to compare it with typically developing children (TDC) – Group B using Linguistic Profile Test (LPT-K). Each domain of language test was evaluated and scored as provided in the manual. Test-retest reliability and inter-rater reliability was calculated for all the scores.

4.1. Inter and Intra reliability

The data collected from both Group A and Group B groups were re-examined by two other judges apart from the investigator. The inter-rater reliability was thus calculated using Cronbach's alpha test, which was found to be greater than 0.99 for the Group B group and 0.98 for the Group A, which indicated high inter-rater reliability.

4.2. Normality

All collected data was subjected to normality test using SPSS 20 version. Shapiro-Wilk Test was used to check the normality. Majority of the parameters showed non-normal distribution. Hence, non-parametric tests were selected for the further analysis.

4.3. Comparison between Group A and Group B

The mean, median, standard deviation and /z/ of the each section and overall scores are given in the Table 4.1, Table 4.2, Table 4.3 and Table 4.4.

4.3.1. Comparison of Phonological abilities across groups

The phonology ability was assessed in two sub sections i.e phonological discrimination and phonetic expression across the groups. The mean values across the groups were compared. In general both the groups performed well in phonetic expression compared to phonological discrimination. On comparison of the median scores between the two groups on the phonology sections, it was seen that the Group A (Median = 86) obtained a lesser median score than the Group B (Median = 90) in all the age range 7 - <8, 8 - <9 and 9 - <10. This indicated that the Group A performed poorer on the sub sections than the Group B. The median values were subjected to Mann-Whitney U Test to find the significant difference, across the two groups. The results revealed that there was a significance difference ($/z/ = 2.34$, $*p < 0.05$) between Group A and Group B on the phonology section, as shown in Table 4.1.

Table 4.1

Mean SD Median and /z/ values across groups' performance on phonological section

Main Sections	Group A			Group B			/z/
	Mean	SD	Median	Mean	SD	Median	
PD	39.53	3.27	40.00	42.33	2.23	43.00	2.75*
PE	45.60	4.80	47.00	47.03	3.58	48.00	0.752
TOTAL	85.13	6.94	86.00	89.70	4.34	90.00	2.34*

*#Note: *p<0.05; # /z/ - modulus test statistics; Standard Deviation (SD); Children with Repaired Cleft Lip and Palate (Group A), Typically Developing Children (Group B); Phonological Discrimination (PD), Phonetic Expression (PE).*

Within the phonological sub-section there was a difference in Phonemic Discrimination (PD) between the groups, which is shown in Table 4.1. These results support the agreement of few studies in the past who found that delay in expressive

language deficit is known to cause phonological disorder in children with cleft lip and palate. (Morris, 1962; Chapman, 1993). The findings related to phonological disorder in Group A may also be due to delay and deviant development of phonology. Extensive review also has indicated that children with cleft palate are known to be at risk for phonetic and phonological disorders (Bzoch, 1956; Bzoch, 1965; Van Demark, Morris, & Vandelaar, 1979; Royal College of Speech and Language Therapists, 2009). The poor performance seen in children with RCLP may also be due to low phonetic repertoire and persisting compensatory articulation seen in school going children.(Chapman 1993; Morris & Ozanne, 2003; D'Antonio & Scherer, 2008).

4.3.2. Comparison of syntactic abilities across groups

The syntactic abilities was assessed in twelve sub sections i.e., Morphophonemic Structures (MS), Plural Forms (PF), Tenses (T), Person Number Gender (PNG), Case Markers (CM), Transitive Intransitives Causatives (TIC), Sentence Types (ST), Predicates (P), Conjunctions Comparatives Quotative (CCQ), Conditional Clauses (CC), Participial Constructions (PC) across the groups. The median values across the groups were compared. In general both the groups performed well in most of sub-sections. On comparison of the median scores between the two groups on the syntax sections, it was seen that the Group A (Median = 52.50) obtained a lesser median score than the Group B (Median = 63.75) in all the age range 7 - <8, 8 - <9 and 9 - <10. This indicated that the Group A performed poorer on the sub sections than the Group B. The median values were subjected to Mann-Whitney U Test to find the significant difference, across the two groups. The results revealed that there was a statistically significant difference ($Z = 3.03$, $*p < 0.05$) between Group A and Group B on the syntax section, which is depicted in Table 4.2.

Table 4.2

Mean SD Median and /z/ values across groups' performance on syntactic section

Sub-Sections	Group A			Group B			/z/
	Mean	SD	Median	Mean	SD	Median	
MS	5.73	1.67	5.50	6.91	1.49	7.00	2.16*
PF	2.73	0.84	3.00	3.20	0.73	3.00	1.65
T	2.733	0.99	2.50	3.33	0.64	3.25	2.66*
PNG	5.46	1.52	5.50	6.88	1.19	6.75	2.67*
CM	5.53	1.40	5.00	6.53	1.33	6.00	2.52*
TIC	4.86	1.18	5.00	6.60	1.16	7.00	3.88*
ST	4.80	1.52	4.00	6.40	1.61	6.00	2.90*
P	5.80	1.82	5.00	6.96	1.21	7.00	2.20*
CCQ	4.53	1.92	4.00	6.26	0.90	6.00	2.99*
CC	3.93	1.33	4.00	5.76	1.10	6.00	4.0*
PC	4.53	1.59	5.00	5.90	0.92	6.00	2.91*
TOTAL	54.06	15.19	52.50	64.53	8.14	63.75	3.03*

*#Note: *p<0.05; #/z/ - modulus test statistics; Standard Deviation (SD); Children with Repaired Cleft Lip and Palate (Group A), Typically Developing Children (Group B); Morphophonemic Structures (MS), Plural Forms (PF), Tenses (T), Person Number Gender (PNG), Case Markers (CM), Transitive Intransitives Causatives (TIC), Sentence Types (ST), Predicates (P), Conjunctions Comparatives Quotative (CCQ), Conditional Clauses (CC), Participial Constructions (PC).*

Within the syntactic sub-section there was a difference in Morphophonemic Structures (MS), Tenses (T), Person Number Gender (PNG), Case Markers (CM), Transitive Intransitives and Causatives (TIC), Sentence Types (ST), Predicates (P), Conjunctions Comparatives and Quotative (CCQ), Conditional Clause (CC) and Participial Constructions (PC) between the groups, which is shown in 4.2. These

results support the finding of previous studies (Kommers and Sullivan, 1979) which indicated that school aged children with cleft palate showed features such as reduced mean length of utterance (MLU), reduced lexical diversity, deviant sentences construction having less complex syntactic structure and will have confusion to recognize the syntax errors.

Other study (Morris & Ozanne, 2003) also showed an evidence of delay in expressive language, acquiring phonetic and phonological speech production, and higher-level of language like semantic, morpho-syntax, in addition to literacy problems in later childhood of school age.

4.3.3. Comparison of semantic abilities across groups

The semantic abilities was assessed in fourteen sub sections i.e., Colors (C), Furniture (F), Body Parts (BP), Naming (N), Lexical Category (LC), Synonymy (S), Antonym (A), Homonymy (H), Polar Questions (PQ), Semantic Anomaly (SA), Paradigmatic Relation (PR), Syntagmatic Relation (SR), Semantic Contiguity (SC), Semantic Similarity (SS) across the groups. The median values across the groups were compared. In general, both the group's performed well in all the sub-sections. On comparison of the median scores between the two groups on the semantic sections, it was seen that Group A (Median = 74) obtained a lesser median score than Group B (Median = 78.75) in all the age range 7 - <8, 8 - <9 and 9 - <10. This indicated that the Group A performed poorer on the sub sections than the Group B. However there was only a very minimal difference in score between the groups. The median values were subjected to Mann-Whitney U Test to find the significant difference, across the two groups. The results revealed that there was no statistical difference ($|z| = 1.55, p > 0.05$) between Group A and Group B on the semantic section, which is depicted in Table 4.3.

Table 4.3

Mean SD Median and /z/ values across groups' performance on semantic section

Sub-Sections	Group A			Group B			/z/
	Mean	SD	Median	Mean	SD	Median	
C	4.60	0.82	5.00	4.46	0.77	5.00	0.84
F	4.26	0.70	4.00	4.53	0.68	5.00	1.35
BP	3.80	1.14	4.00	3.90	0.88	4.00	0.10
N	18.46	1.50	19.00	18.36	1.18	18.00	0.57
LC	9.20	2.62	10.00	9.86	2.16	10.00	0.74
S	3.26	1.27	3.00	3.96	1.03	4.00	1.78
A	3.13	1.30	3.00	3.63	0.92	4.00	1.15
H	1.56	0.79	1.50	2.31	0.71	2.00	2.72*
PQ	8.46	1.35	9.00	8.80	0.80	9.00	0.53
SA	2.66	1.35	2.00	3.61	0.85	3.75	2.44*
PR	3.80	1.08	4.00	4.36	0.76	4.50	1.79
SR	3.20	0.56	3.00	3.93	0.78	4.00	2.87*
TOTAL	72.60	10.12	74.00	78.31	7.89	78.75	1.55

*#Note: *p<0.05; # /z/ - modulus test statistics; Standard Deviation (SD); Children with Repaired Cleft Lip and Palate (Group A), Typically Developing Children (Group B); Colors (C), Furniture (F), Body Parts (BP), Naming (N), Lexical Category (LC), Synonymy (S), Antonymy (A), Homonymy (H), Polar Questions (PQ), Semantic Anomaly (SA), Paradigmatic Relation (PR), Syntagmatic Relation (SR), Semantic Contiguity (SC), Semantic Similarity (SS).*

Within the semantic section no significant difference was seen in many of the sub-sections but few difference in Homonymy (H), Semantic Anomaly (SA), Syntagmatic Relations (SR) and Semantic Contiguity (SC) between the groups, was noticed as shown in Table 4.3.

These results of the present study do not support the previous studies. Richman and Ryan, 2004) showed that Group A had problem in verbal reasoning, categorization, abstract reasoning, use of verbal mediation for problem solving, rapid naming. Other studies (Lierde, 2014; Anaraki & Haresabadi, 2017) also indicated that that children with cleft usually have delay in the semantic structure with reduced early word acquisition, poor in homonymy and in sentence comprehension.

4.3.4. Comparison of overall linguistic abilities across groups

Table 4.4

Mean SD Median and /z/ values across groups' performance on linguistic section

Main Sections	Group A			Group B			/z/
	Mean	SD	Median	Mean	SD	Median	
PHONOLOGY	85.13	6.94	86.00	89.70	4.34	90.00	2.34*
SYNTAX	54.06	15.19	52.50	64.53	8.14	63.75	3.03*
SEMANTICS	72.60	10.12	74.00	78.31	7.89	78.75	1.55
OVER ALL	212.13	25.04	211.50	233.90	17.49	231.50	2.76*

*#Note: *p<0.05; # /z/ - modulus test statistics; Standard Deviation (SD); Children with Repaired Cleft Lip and Palate (Group A), Typically Developing Children (Group B).*

The overall linguistic abilities was assessed in three sections i.e., phonology, semantics and syntax across the groups. The median values across the groups were compared. In general both the groups performed well in all the sections. On comparison of the median scores between the two groups on the overall sections, it was seen that Group A (Median = 211.50) obtained a lesser median score than the Group B (Median = 231.50) in all age ranges 7 - <8, 8 - <9 and 9 - <10. This indicated that the Group A performed poorer on the sections than the Group B. The median values were subjected to Mann-whitney U test to find the significant difference,

across the two groups. The results revealed that there was a statistically significant difference ($t = 2.76$, $*p < 0.05$) between Group A and Group B on overall scores of section, which is depicted in Table 4.4.

The results of the present study provide an insight about the difference between Group A and Group B in their linguistics skills. Results indicated that there was a statically significant difference between Group A and Group B in phonology and syntax sections and overall scores. The significant difference was not evident in semantic abilities across groups.

These results support the agreement of only few studies reporting that children with cleft palate performed significantly different from typical group on measures of receptive and expressive language (Philips and Harrison, 1969; Chapman, 1994; Kristina Wilson, 2007; Anaraki & Haresabadi, 2017). But most of the studies as highlighted that children with RCLP are reported to have decreased abilities in expressive language skills with intact receptive language skills (McWilliams, Morris, & Shelton, 1990; Pamplona, 2000; Morris & Ozanne, 2003; Lowe and Scherer, 2003; Hardin-Jones & Chapman, 2011; Lierde, 2014).

Although the difference exists in the early childhood, there is a difference in expressive language skills in the school going children. Few of the studies indicated that these language delays will disappear by school age (Spriestersbach, 1958; McWilliams, Morris, & Shelton, 1990 and Chapman, 2006). Thus findings of the present study indicates that the difference in some of the language parameters improve as the age increase.

The findings of the study were not in agreement with most of the studies in literature and can be attributed to many reasons. The delay in the acquisition of the

language and phonological disorder might have lead to the delay in semantic and syntactic abilities in Group A.

Studies in the past reported that performance in linguistic skills in children varied across language (Rosselli et al., 2002). The present study considered Kannada speaking participants, whereas the studies in the past have considered language such as English (McWilliams, Morris, & Shelton, 1990; Pamplona, 2000; Morris & Ozanne, 2003; Lowe and Scherer, 2003; Hardin-Jones & Chapman, 2011; Lierde, 2014 Chapman 1993; Morris & Ozanne, 2003; D'Antonio & Scherer, 2008). The performance of the subjects might vary in different language structures based on the the complexity of the language , structure of the language acquisition and differences of phonological and word structures of languages. The result obtained in this study may not be generalized to other languages (Stoel-Gammon, 2011).

4.4 Comparison between Group A and Group B across age range

The mean, median and standard deviation of the each parameters and overall scores are given in the Table 4.5, Table 4.6, Table 4.7 and Table 4.8.

Table 4.5

Mean SD Median and /z/ values of both the groups' performance of phonological section across age range

Sub-sections	Age	Group A			Group B			/z/
		Mean	Standard Deviation	Median	Mean	Standard Deviation	Median	
PD	7 - <8	39.20	3.63	38.00	41.60	2.41	42.50	1.23
	8 - <9	37.60	2.60	38.00	41.70	2.00	42.00	2.46*
	9 - <10	41.80	2.48	40.00	43.70	1.76	44.00	1.37
PE	7 - <8	46.50	2.22	47.00	49.50	1.58	49.00	2.12*
	8 - <9	41.20	5.49	41.00	46.60	3.80	48.00	1.72
	9 - <10	46.60	2.88	46.00	48.00	4.52	49.00	0.99
PHON	7 - <8	88.20	3.56	87.00	88.10	2.96	88.00	0.06
OLOG	8 - <9	78.80	7.82	81.00	88.30	3.36	89.50	2.52*
Y	9 - <10	88.40	4.44	89.00	92.70	5.07	93.00	1.78

#Note: * $p < 0.05$; # /z/ - modulus test statistics; Standard Deviation (SD); Children with Repaired Cleft Lip and Palate (Group A), Typically Developing Children (Group B); Phonological Discrimination (PD), Phonetic Expression (PE).

Table 4.6

Mean SD Median and /z/ values of both the groups' performance of syntactic section across age range

Sub-sections	Age	Group A			Group B			/z/
		Mean	Standard Deviation	Median	Mean	Standard Deviation	Median	
MS	7 - <8	5.60	2.07	6.00	5.95	1.83	5.25	0.30
	8 - <9	4.80	1.03	4.50	6.95	1.14	6.75	2.58*
	9 - <10	6.80	1.39	6.50	7.85	0.74	7.75	1.24
PF	7 - <8	2.90	0.89	3.00	2.90	0.69	2.75	0.06
	8 - <9	2.40	0.82	2.00	3.10	0.61	3.00	1.50
	9 - <10	2.90	0.89	3.00	3.60	0.77	3.50	1.30
T	7 - <8	2.70	1.35	2.50	3.00	0.62	3.00	1.32
	8 - <9	2.60	0.89	2.50	3.20	0.53	3.00	1.25

	9 - <10	2.90	0.89	2.50	3.80	0.53	3.75	2.01*
PNG	7 - <8	5.20	1.48	5.00	6.35	0.94	6.25	1.72
	8 - <9	5.00	1.22	5.50	6.55	0.83	6.50	2.23*
	9 - <10	6.20	1.85	6.50	7.75	1.31	7.25	1.36
CM	7 - <8	6.20	1.64	6.00	6.20	1.03	6.00	0.66
	8 - <9	5.00	1.41	5.00	6.10	1.37	6.00	1.39
	9 - <10	5.40	1.14	5.00	7.30	1.33	7.00	2.33*
TIC	7 - <8	5.20	1.64	5.00	6.00	1.05	6.00	1.46
	8 - <9	4.60	0.89	4.00	6.40	1.26	6.50	2.32*
	9 - <10	4.80	1.09	5.00	7.40	0.69	7.50	3.09*
ST	7 - <8	5.40	1.94	6.00	5.40	1.34	5.00	0.00
	8 - <9	4.40	1.67	4.00	6.40	1.50	6.50	1.99*
	9 - <10	4.60	0.89	4.00	7.40	1.42	7.50	2.89*
P	7 - <8	6.40	2.19	7.00	5.90	0.73	6.00	1.09
	8 - <9	5.00	1.87	5.00	7.10	0.87	7.00	2.13*
	9 - <10	6.00	1.41	5.00	7.90	1.10	8.00	2.36*
CCQ	7 - <8	4.40	2.30	4.00	5.70	0.67	6.00	1.65
	8 - <9	4.80	2.16	4.00	6.30	0.94	6.00	1.26
	9 - <10	4.40	1.67	4.00	6.80	0.78	7.00	2.39*
CC	7 - <8	3.40	1.67	3.00	5.20	0.91	5.00	2.01*
	8 - <9	4.00	1.22	4.00	5.80	0.63	6.00	2.84*
	9 - <10	4.40	1.14	4.00	6.30	1.41	6.00	2.46*
PC	7 - <8	4.00	2.00	3.00	5.70	0.94	6.00	1.69
	8 - <9	4.60	1.67	5.00	5.50	0.70	6.00	1.29
	9 - <10	5.00	1.22	5.00	6.50	0.84	6.50	2.15*
SYNT	7 - <8	51.40	15.96	55.00	58.30	4.72	57.75	1.04
	8 - <9	47.20	8.14	48.00	63.40	5.29	63.75	2.81*
AX	9 - <10	63.60	17.46	57.00	71.90	7.64	71.00	1.41

#Note: * $p < 0.05$; # /z/ - modulus test statistics; Standard Deviation (SD); Children with Repaired Cleft Lip and Palate (Group A), Typically Developing Children (Group B); Morphophonemic Structures (MS), Plural Forms (PF), Tenses (T), Person Number Gender (PNG), Case Markers (CM), Transitive Intransitives Causatives (TIC), Sentence Types (ST), Predicates (P), Conjunctions Comparatives Quotative (CCQ), Conditional Clauses (CC), Participial Constructions (PC).

Table 4.7

Mean SD Median and /z/ values of both the groups' performance of semantic section across age range

Sub-sections	Age	Group A			Group B			/z/
		Mean	Standard Deviation	Median	Mean	Standard Deviation	Median	
C	7 - <8	4.20	1.09	5.00	4.20	0.78	4.00	0.13
	8 - <9	4.60	0.89	5.00	4.30	0.94	5.00	0.66
	9 - <10	5.00	0.00	5.00	4.90	0.31	5.00	0.70
F	7 - <8	4.20	0.44	4.00	4.40	0.84	5.00	0.80
	8 - <9	4.00	0.70	4.00	4.20	0.63	4.00	0.56
	9 - <10	4.60	0.89	5.00	5.00	0.00	5.00	1.41
BP	7 - <8	2.80	1.09	2.00	3.40	0.84	3.00	1.09
	8 - <9	4.40	0.89	5.00	3.90	0.73	4.00	1.17
	9 - <10	4.20	0.83	4.00	4.40	0.84	5.00	0.53
N	7 - <8	18.40	0.89	19.00	17.50	0.84	17.50	1.73
	8 - <9	17.80	2.28	18.00	18.70	0.94	19.00	0.56
	9 - <10	19.20	0.83	19.00	18.90	1.28	19.00	0.25
LC	7 - <8	7.20	2.68	7.00	7.90	1.28	8.00	0.37
	8 - <9	8.80	1.30	9.00	9.50	1.35	10.00	0.90
	9 - <10	11.60	1.67	12.00	12.20	1.03	12.50	0.89
S	7 - <8	3.40	1.34	4.00	3.40	0.96	3.50	0.06
	8 - <9	2.60	1.14	3.00	3.60	0.96	3.50	1.53
	9 - <10	3.80	1.30	4.00	4.90	0.31	5.00	2.12*
A	7 - <8	3.00	1.58	3.00	3.10	0.99	3.00	0.12
	8 - <9	3.40	1.51	4.00	3.50	0.70	3.00	0.33
	9 - <10	3.00	1.00	3.00	4.30	0.67	4.00	2.28*
H	7 - <8	1.20	0.97	1.50	1.75	0.35	2.00	1.29
	8 - <9	1.40	0.65	1.00	2.15	0.47	2.00	2.07*
	9 - <10	2.10	0.54	2.50	3.05	0.55	3.00	2.64*
PQ	7 - <8	8.20	1.48	8.00	8.70	0.82	8.50	0.58
	8 - <9	8.60	1.67	9.00	8.70	0.82	8.50	0.25
	9 - <10	8.60	1.14	9.00	9.00	0.81	9.00	0.64

	7 - <8	3.10	1.43	3.00	3.20	0.75	3.25	0.58
SA	8 - <9	2.10	1.08	2.00	3.45	0.79	3.75	0.25
	9 - <10	2.80	1.60	2.00	4.20	0.75	4.00	2.23*
	7 - <8	3.60	1.51	4.00	4.00	0.94	4.00	1.57
PR	8 - <9	3.60	1.14	4.00	4.40	0.69	4.50	0.32
	9 - <10	4.20	0.44	4.00	4.70	0.48	5.00	1.44
	7 - <8	3.20	0.44	3.00	3.50	0.70	3.00	1.76
SR	8 - <9	3.00	0.70	3.00	3.90	0.73	4.00	0.81
	9 - <10	3.40	0.54	3.00	4.40	0.69	4.50	1.96*
	7 - <8	2.60	0.54	3.00	3.50	0.70	3.00	2.28*
SC	8 - <9	2.40	0.54	2.00	3.60	0.69	3.50	2.23*
	9 - <10	3.00	0.70	3.00	4.20	1.03	4.50	2.61*
	7 - <8	2.40	1.51	2.00	2.80	0.78	3.00	1.17
SS	8 - <9	3.20	0.83	3.00	3.20	0.78	3.00	0.00
	9 - <10	3.20	0.83	3.00	3.90	0.73	4.00	1.45
SEMA NTIC	7 - <8	70.20	12.75	73.50	71.35	4.83	69.75	0.12
	8 - <9	68.90	9.02	71.00	77.10	5.57	77.25	1.83
	9 - <10	82.70	6.63	80.50	86.50	4.02	86.25	1.69

*#Note: *p<0.05; # /z/ - modulus test statistics; Standard Deviation (SD); Children with Repaired Cleft Lip and Palate (Group A), Typically Developing Children (Group B); Colors (C), Furniture (F), Body Parts (BP), Naming (N), Lexical Category (LC), Synonymy (S), Antonymy (A), Homonymy (H), Polar Questions (PQ), Semantic Anomaly (SA), Paradigmatic Relation (PR), Syntagmatic Relation (SR), Semantic Contiguity (SC), Semantic Similarity (SS).*

Table 4.8

Mean SD Median and /z/ values of both the groups' performance of linguistic section across age range

Sub-sections	Age	Group A			Group B			/z/
		Mean	Standard Deviation	Median	Mean	Standard Deviation	Median	
PHONOLOGY	7 - <8	88.20	3.56	87.00	88.10	2.96	88.00	0.06
	8 - <9	78.80	7.82	81.00	88.30	3.36	89.50	2.52*
	9 - <10	88.40	4.44	89.00	92.70	5.07	93.00	1.78
SYNTAX	7 - <8	51.40	15.96	55.00	58.30	4.72	57.75	1.04
	8 - <9	47.20	8.14	48.00	63.40	5.29	63.75	2.81*
	9 - <10	63.60	17.46	57.00	71.90	7.64	71.00	1.41
SEMANTIC	7 - <8	70.20	12.75	73.50	71.35	4.83	69.75	0.12
	8 - <9	68.90	9.02	71.00	77.10	5.57	77.25	1.83
	9 - <10	82.70	6.63	80.50	86.50	4.02	86.25	1.69
OVERALL	7 - <8	209.80	31.08	214.50	221.60	11.14	221.00	0.61
	8 - <9	195.90	11.62	195.50	230.70	14.49	231.50	2.93*
	9 - <10	230.70	18.08	228.50	249.40	14.34	250.00	1.77

*#Note: *p<0.05; # /z/ - modulus test statistics; Standard Deviation (SD); Children with Repaired Cleft Lip and Palate (Group A), Typically Developing Children (Group B).*

On comparison of the median scores between the two groups in this age range (7 - <8 years) on phonology, semantics, syntax and overall scores, it was seen that the Group A (Median = 214.50) obtained a lesser median score than the Group B (Median = 221) in 7 - <8 age group. This indicated that the Group A performed poorer on the sections than the Group B. However, there was only a very minimal difference in score between the groups. The median values were subjected to Mann-Whitney U test to determine significant difference, if any, between the two groups. The results revealed that there was no statistical difference ($/z/ = 0.61, p > 0.05$) between the

Group A and Group B in all the sections and overall scores. But on in depth analysis of the sections few sub-sections showed significant differences and rest were not different. Sub-section Phonetic expression (PE) of phonology, Conditional Clause (CC) and Participial Constructions (PC) of syntax showed significant difference. The mean, standard deviation, median and the z values have been depicted in Table 4.5, Table 4.6, Table 4.7 and Table 4.8.

On comparison of the median scores between the two groups in this age range (8 - <9 years) on phonology, semantics, syntax and overall scores, it was seen that the Group A (Median = 195.50) obtained a lesser median score than the Group B (Median = 231.50) in 8 - <9 age group in all the sections and overall scores. This indicated that the Group A performed poorer on the sections than the Group B. The median values were subjected to Mann-Whitney U test to determine significant difference, if any, between the two groups. The results revealed that there was a statistically significant difference ($z = 2.93$, $*p < 0.05$) between the Group A and Group B in all the sections and overall scores, except semantic section. On in depth analysis of the sections few sub-sections showed significant differences and rest were not significant. Sub-section Phonemic Discrimination (PD) of phonology, Morphophonemic Structures (MS), Person Number Gender (PNG), Transitive Intransitives and Causatives (TIC), Sentence Types (ST), Predicates (P), Conditional Clause (CC) of syntax showed significant difference and also few semantic sub-sections Homonymy (H), Semantic Anomaly (SA), Syntagmatic Relations (SR) and Semantic Contiguity (SC) showed significant differences. The mean, standard deviation, median and the z values have been depicted in Table 4.5, Table 4.6, Table 4.7 and Table 4.8.

On comparison of the median scores between the two groups in this age range (9 - <10years) in phonology, semantics, syntax and overall scores, it was seen that the

Group A (Median = 228.50) obtained a lesser median score than the Group B (Median = 250) in 9 - <10 age group. This indicated that Group A performed poorer on the sections than the Group B, however there was only a very minimal difference in score between the groups. The median values were subjected to Mann-Whitney U test to determine significant difference, if any, between the two groups. The results revealed that there was no statistical difference ($z = 1.77, p > 0.05$) between the Group A and Group B in all the sections and overall scores. But on in depth analysis of the sections few sub-sections showed significant differences and rest were not different. Sub-section Tenses (T), Case Markers (CM), Transitive Intransitives and Causatives (TIC), Sentence Types (ST), Predicates (P), Conjunctions Comparatives and Quotative (CCQ), Conditional Clause (CC) and Participial Constructions (PC) of syntax and Synonyms (S), Antonym (A), Homonymy (H), Syntagmatic Relations (SR) and Semantic Contiguity (SC) of semantic sections showed significant difference. The mean, standard deviation and the z values have been depicted in Table 4.5, Table 4.6, Table 4.7 and Table 4.8.

The results of the present study indicated that there was a statistically significant difference between Group A and Group B in phonology and syntax sections and overall scores only in 8 - <9 years. Also when looked on to the in-depth analyses of the sub-sections across age range, the younger age group (7 - <8 years) performed better than the elder age group (8 - <9 years). Whereas the elder age group (9 - <10 years) performed poorer than the younger age groups (8 - <9 years).

The findings of the present study indicate that the language proficiency of participants in Group A was found to be different from that of Group B in age group (8 - <9) but not in other two age groups (7 - <8; 9 - <10) which shows the heterogeneity of the population. These findings are in agreement with the findings of

Shprintzen (1995). She reported that some of the apparent lack of consensus in the literature comes from the fact that the presence of a cleft lip and/or cleft palate is a very heterogeneous population with one feature in common. In many cases, the cleft may be an isolated abnormality, or it may be one feature of a multiple malformation syndrome. And so, any discussion of communication disorders associated with cleft lip and/or cleft palate may necessarily be misleading because of generalities. Variables that impact communication in individuals with Cleft Lip and/or Palate contributing to the heterogeneity of the population are: Cleft type/severity; Associated syndromes or other associated conditions; Age at the time of palate repair; Efficacy of the palate repair; Unrepaired residual cleft; Presence of a palatal fistula; Status of velopharyngeal function; Hearing status over time; Timing, amount and efficacy of communication interventions and Socioeconomic/linguistic status of the family. Because of this there is no linearity in linguistic performance across age group.

Another reason could be due to articulation problems, and less willingness to involve oneself in conversations, socio-emotional difficulties arise within this group (Murray, Hentges, Hill et al., 2008) and the time of language acquisition performance and the disorder vary across age (Philips & Harrison, 1969).

Another attribution is that the discrepancy between language functioning and expected language age increases as age advances (Chakravarthi, 2012) that is the phonology and semantic skills found to be the areas of strength at 8 years of age, while syntax and verbal expression were found to be significant deficit areas in 7- to 10-year-old children with language impairments.

Even the repeated exposure to pain related to surgery experienced by some children with cleft palate may interfere with their readiness to learn and thus be related to the observed delay (Savage, Neiman, & Reuter, 1994)

Thus to summarize, there was a significant differences between Group A and Group B in sections of phonology, syntax and overall scores. Also when comparison made across age range between the Group A and Group B there was a significant difference, only in 8-9 years of age range in phonology and syntax sections and in overall scores.

CHAPTER 5

SUMMARY AND CONCLUSION

Cleft lip and palate (CLP) is a congenital malformation which are usually associated with speech, language, cognitive and psychological issues. The performance in these children RCLP depend on factors of cleft type/severity, associated syndromes, age at which palate repair was done and its efficiency, unrepaired residual cleft, presence of fistula, status of velopharyngeal function, hearing status, amount and efficacy of communication interventions and socioeconomic status of the family.

The language difficulties in children with repaired cleft lip and palate (RCLP) present with include domains such as phonology, syntax, semantic and pragmatics and can be due to the poor hearing, frequent hospitalizations, deviant speech and language skills, socio-cultural variables, psychological issues and low cognitive ability. The most common deficits in linguistic performance in children with RCLP include deficits in vocabulary size, reduced mean length of utterance (MLU), morpho-syntactic skills and reduced phonetic repertoire.

The present study aimed to investigate the language skills in Kannada speaking children with RCLP in age range of 7-10 years persons using Linguistic profile test (LPT-K). The specific objectives were to compare the phonological, syntactical and semantic and overall language scores in children with RCLP (Group A) with typically developing children (Group B).

Group A consisted of fifteen children native Kannada language in the age range of 7-10 years and this group was divided into three age ranges (7 - <8; 8 - <9; 9 - <10 years). Participants of Group A were recruited based on specific inclusion and

exclusion criteria. Thirty age, gender and language matched children constituted the Group B.

The stimulus used to assess the language performance was the Linguistic Profile Test in Kannada (LPT – K, Suchithra & Karanth, 1990). The test consisted of three domains namely, phonology, syntax and semantics. The raw scores on language skills of children obtained were tabulated for further analysis.

Test retest reliability and Inter-rater reliability were found to be adequate in both the Group A and Group B for language performance. The performance was analyzed across the groups and within a group. The results revealed that the Group A performed poorer than Group B on all the sections except semantic sections of Linguistic profile. Also a developmental trend was observed across all the age range in all the domains. Comparison was made across age range between the Group A and Group B there was a significant difference, only in 8-9 years of age range in phonology and syntax sections and in overall scores. Overall , the performance varied across the subsections and groups due to the heterogenicity of the children considered for the study.

The above results can be attributed to many reasons. The reasons could be the delay in language acquisition and poor phonological abilities due to various factors such as frequent hospitalization, frequent otitis media, poor input of maternal stimulation etc. The grammatical structure of the Kannada language itself poses a hurdle for children to acquire the basics of the language. Children of Group A often require language stimulation at the younger age itself. The children participated in the present study had a varied amount of intervention with a minimum period of one month of speech and language therapy. This could be one of the important reason for

the present results of the study because, language intervention play an important role in their language stimulation as well as, language learning.

Due to lack of adequate intervention in children of Group A their results are lower when compared to that of children of Group B. Most of the time, it is the speaking ability of the children of children with cleft palate, that is targeted and studied in the research. Thus it is clear from this study that, language abilities are very different between children of Group A and Group B. As clinicians it is important to target both speech and language simultaneously in children with cleft palate. Thus the present study does provide supportive evidence to the fact that, language abilities of children of Group A are different and the reasons can be posed to both environmental and personal factors of these children.

5.2. Implication

The language profiles derived of children with cleft palate a useful for establishing a baseline and managing appropriate intervention.

5.3. Limitations

The main limitation of the study is the limited sample size and heterogeneity of the population considered. Hence one must exercise caution while generalizing the results of the study. Other language tool can also be used to assess better for comprehension and expression where LPT-K is more of judgment task. Children's verbal reading and discourse skills could not be assessed as it was a part of test in LPT-K for qualitative and correlations analysis of overall linguistic skills of the children with RCLP.

5.4. Future Directions

Similar research can be carried on a larger sample with different types of cleft across different language and different age range. The language abilities can be compared across early Vs later surgical intervention groups.

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APPENDIX A

CASE NAME: XYZ

CLEFT TYPE: REPAIRED UNILATERAL
CLEFT LIP AND PALATE

AGE: 9.8 YEARS | MALE

EDUCATION: IV GRADE

Linguistic Profile Test

Section	Possible	Subject's Score						Total
		Stimulus		Response				
		Verbal	Graphic	Verbal	Graphic	Gestural		
SECTION I (Phonology)								
A. Phonemic discrimination	48			44			89	
B. Phonetic Expression	52			45				
SECTION II (Syntax)								
A. Morphophonemic Structures	10			8				
B. Plural forms	5			4				
C. Tenses	5			2.5				
D. PNG Markers	10			7.5				
E. Case Markers	10			5				
F. Transitives, Intransitives and Causatives	10			5			57	
G. Sentence Types	10			4				
H. Predicates	10			5				
I. Conjunctions, Comparatives and Quotatives	10			5				
J. Conditional clauses	10			4				
K. Participial constructions	10			7				
SECTION III (Semantics)								
Semantic Discrimination								
1. Colors	5			5				
2. Furniture	5			5				
3. Body Parts	5			4				
Semantic Expression								
1. Naming	20			19				
2. Lexical Category	15			14			82.5	
3. Synonymy	5			2				
4. Antonymy	5			2				
5. Homonymy	5			2.5				
6. Polar Question	10			9				
7. Semantic Anomaly	5			5				
8. Paradigmatic Relations	5			4				
9. Syntagmatic Relations	5			4				
10. Semantic Contiguity	5			4				
11. Semantic Similarity	5			3				
Grand Total	300						228.5	

LPT SECTIONS

Clinical impression:

	PHONOLOGY - 89
Signature of the staff	SYNTAX - 57
	SEMANTICS - 82.5
	OVER ALL - 228.5

Clinician

APPENDIX B



ALL INDIA INSTITUTE OF SPEECH AND HEARING: MYSORE-06

DEPARTMENT OF SPEECH LANGUAGE PATHOLOGY

Informed consent form

Title: "Language skills in 7 – 10 year children with repaired cleft lip and palate"

Guide: Dr. Pushpavathi M., Professor in Speech Language Pathology, AIISH, Mysore

Student: Mr. Sumanth P. AIISH, Mysore

Description of the study:

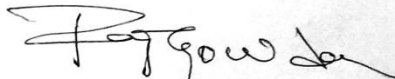
This study aims at assessing the kannada language skills of children with repaired cleft lip and palate in the age range of 7-10 years and comparing with typically developing children. This study involves the children to judge a series of Kannada words and sentences as correct or incorrect and the responses will be both audio and video recorded and analyzed later. The approximate time of administration of test will be around 70 minutes per individual. This data will help to find the language abilities of children with cleft lip & palate and to counsel the parents regarding the importance of speech and language stimulation and regular follow ups. This procedure is harmless and has only clinical implication and you will not receive any financial benefits from it. The confidentiality will be maintained for the data collected.

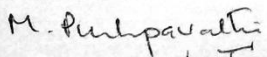
Consent for participation

I have been informed about and understand the purpose of the study and my participation in it. I also understand that the procedure is purely harmless and it has only research benefits and personally I do not receive any benefits from it. I give my consent for the testing for the research proposes.

(AGREE/DISAGREE)

Date:


Signature & Name of the subject


1/12/17.

Dr. M. PUSHPAVATHI
Ph.D., (Sp & Hg)
Professor in Speech Pathology
All India Institute of Speech and Hearing
Manasagangothri, Mysore-6