

## Speech Intelligibility in Repaired Cleft Lip and Palate Children

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### Introduction

Communication is the exchange and flow of information and ideas from one person to another. Communication takes place when sender transmits or directs a set of symbols to another individual, a receiver. The set of symbols is typically described as a message. (Rice & Johnson, 2008)

Effective communication depends on how intelligible speech of the speaker is, how well the speaker's speech meets the cultural standards and how much the listener perceives or understands of what the speaker conveys. ie, speech should be intelligible.

Speech intelligibility refers to the ability to understand speech. It is the match between the intention of the speaker and the response from the listener. It refers to the ability to use speech for effective communication in everyday situation. During communication, intelligibility is a measure of how comprehensible speech in a given condition. Intelligibility is affected by the quality of speech signal, background noise, reverberation, and properties of communication system.

Speech intelligibility is affected in certain conditions like cleft lip, cleft palate, malocclusion, abnormal alveolar ridge, syndromic conditions etc. Maxillofacial surgeries, dentist design dentures and other prosthetic devices can be used to overcome this problem.

Unintelligible speech is predominantly seen in individuals with cleft lip and palate. Cleft is defined as an abnormal opening or a fissure in an anatomical structure that is normally closed. Cleft lip is the result of the failure of parts of the lip to come together early in the life fetus. Cleft palate occurs when the parts of the roof of the mouth do not fuse normally during fetus development, leaving a larger opening between the oral cavity and the nasal cavity. It may vary in length and width depending on the degree of fusion of the individuals. (Kummer& Ann 2001)

Parthanee and Thai (2013) reported about the types of articulation errors in speech camp and they found that abnormal backing of oral targets was most common speech type and further study, and early prevention of articulation disorders are needed.

Konst (2003) analyzed about the use of perceptual evaluation instrument to assess the effect of infant orthopedics on the speech of toddlers to cleft lip and palate and they found that evaluation of speech by means of the present newly developed perceptual rating instrument showed that 10 groups obtained significantly higher rating for intelligible than-10 groups. The group did not differ regarding any of the other speed aspects.

In the case of Pierre Robin sequence, crowding in utero can cause head to be down and mandible to be retracted and thus restricting oral cavity space. Causes mainly includes interruption of the nutritional or oxygen supply to the embryo. The interruptions may be attributed to extreme malnutrition of the mother, vitamin A, B deficiency, the Rh incompatibility or an atypical or insufficient circulation in the embryo. Defective development at the periphery of adjoining process at this time interferes with fusion and once the scheduled time is elapsed, further growth would widen the gap. (Kummer& Ann 2001)

Kaufman (2004) suggested that vascular supply to the right half of the head is greater than to left and therefore it probably accounts for the more frequent occurrence of cleft of lip and alveolar process on the left side.

Speech intelligibility is severely affected in individuals with cleft lip and palate. Speech intelligibility can be measured by using instrumental and perceptual methods. Rating scales are mainly used to assess the speech intelligibility perceptually. Rating scale is a set of categories designed to elicit information about a quantitative or a qualitative data.

Jessyka and James (2011) reported about closure of palatal fistula, and they found that the occurrence of palatal fistulae in children with a cleft palate deformity after primary palatoplasty remains a relatively common complication. Symptomatic fistulae may cause problems with nasal air escape, nasal regurgitation, decreased speech intelligibility, articulation

errors, and halitosis. A thorough understanding of the multiple reconstructive options, ranging from local flaps to free tissue transfer, is important in obtaining good patient outcomes. In this article, we describe some of the most commonly used methods for palatal closure.

Abologoun and Acta (2013) studied the effectiveness of palatal lift prosthesis in patients with previous operated cleft palate and the results shows that young patients with repaired palatal cleft have significant improvement after application of palatal lift prosthesis.

Mara and Elena (2015) explained about linguistic development in cleft palate patients with and without compensatory articulation disorder and they found that a detailed evaluation of all aspects of cognitive and linguistic organization should be performed in cleft palate patients, especially in patients present with CAD. Moreover,

Karim and Ayub (2014) studied whether early repair of cleft lip helps to reduce the cleft alveolar and palatal gap in unilateral complete cleft lip-palate patients, and they concluded that in unilateral complete cleft lip palate patient, early cleft lip repair results, reduction of gaps of alveolar cleft and that of hard palate remarkably, especially in the patients who came for cleft lip surgery in appropriate time.

### **Need of the Study**

Effective communication depends on the intelligibility of speech that has to be conveyed. Intelligibility is affected in certain conditions like cleft lip, cleft palate, and other syndromes. The dearth of literature on speech intelligibility of repaired cleft lip and palate in children inspired to conduct this study. Study was mainly carried out to check whether there is any discrepancy between SLPs and non SLPs in the perception of speech intelligibility in repaired cleft lip and palate children after surgery.

### **Aim of the Study**

The aim of the study was to rate the speech intelligibility of repaired cleft lip and palate subjects by Speech language pathologists and non speech language pathologists.

### **Methodology**

The aim of the study was to rate the speech intelligibility of repaired cleft lip and palate subjects by SLPs and non SLPs.

### **Subject Selection**

Twenty repaired cleft lip and palate children between the age range of 3-7 years with no history of neurological problem and hearing loss were participated in the present study.

<b>Subject</b>	<b>Age</b>	<b>Age at which surgery was done</b>
Subject 1	5.5	3.5
Subject 2	6	4
Subject 3	7	5
Subject 4	6	4
Subject 5	5	3
Subject 6	5	3
Subject 7	7	5
Subject 8	6	4
Subject 9	6	4
Subject 10	5.3	3.3
Subject 11	5	3
Subject 12	5	3
Subject 13	6	4
Subject 14	7	5
Subject 15	5	3
Subject 16	6	4
Subject 17	6	4
Subject 18	5.5	3.5
Subject 19	5.3	3.5
Subject 20	6	4

**Table 1: Showing subject details including age of the subject and age at which surgery was performed**

### **Inclusion Criteria**

- 1) Children who have undergone cleft lip and palate surgery before 2 years of the study
- 2) Native Malayalam speakers were taken for the study
- 3) Children between the age of 3 to 7 years were included

### **Exclusion Criteria**

Children with any other medical issues and syndromic conditions were excluded in the study.

### **Material Used**

Speech sample was collected by using different methods.

- 1) Subjects were asked to repeat bisyllabic words. E.g., /pa:pi:/, /ka:ki/ /sa:si/ after clinician.

2) Subjects were asked to repeat words like /papa:/, /puli:/ etc.,and also sentences after clinician.

Subjects were asked to repeat stimulus which is uttered by the clinician and recording was done using voice recorder.

### Analysis and Rating

A 5-point intelligibility rating scale developed by National technical institute of deaf (NTID) shown below was used for the study.

The obtained scores were statistically analyzed using Friedman test for significance.

Speech cannot be understood	1
Speech is very difficult to understand only isolated words or phrases are intelligible	2
Speech is very difficult to understand; however, the gist of the content can be understood	3
Speech is intelligible with the exception of a few words or phrases	4
Speech is completely intelligible	5

### Results and Discussion

The present study aimed to analyze the speech intelligibility of repaired cleft lip and palate children at an age range of 3-7 years by SLPs and non SLPs and results obtained are discussed below.

#### Comparison of Average Response among Non-SLPs

##### Intra-class correlation coefficient

	Intraclass correlation	95% confidence interval		p	
		Lower bound	Upper bound		
Agreement among nonSlp's	.778	.603	.897	P<0.00001	HS

**Table 1: Showing interclass correlation coefficient among non-SLPs.p<0.000**

Table 1 clearly shows there is high significant difference (p<0.0001) in speech intelligibility rating among non SLPs.

## Comparison of Average Response among SLPs

### Intraclass correlation coefficient

	Intraclass correlation	95% confidence interval		p	
		Lower bound	Upper bound		
Agreement among Slp's	.931	.872	.969	P<0.00001	HS

**Table 2: shows interclass correlation coefficient among SLPs.**

Fig 2 and Table 2 clearly show there is high significant difference ( $p < 0.0001$ ) in speech intelligibility rating among SLPs.

## Comparison among SLPs and Non-SLPs

### Intraclass correlation coefficient

	Intraclass correlation	95% confidence interval		p	
		Lower bound	Upper bound		
Agreement among Slp's and non Slp's	.847	.547	.943	P<0.00001	HS

**Table 3: showing comparison among SLPs and non SLPs**

From the results shown on the table 3, it can be seen that high significant difference was reported when the rating scores are compared across SLPs and non SLPs.

## Discussion

The comparison of average response within SLPs and non SLPs shows that there is high significant difference ( $p < 0.0001$ ) within the group. Overall results shows that there is high significant difference when the rating scores are compared across SLPs and non SLPs.

Present study is supporting Konst&Hanny (2000), study where they have said an intelligibility assessment of toddlers with cleft lip and palate who received and did not receive pre surgical infant orthopedic treatment and results showed that children in the treatment group were rated as exhibiting intelligibility than non treated group.

## Summary and Conclusion

Speech intelligibility refers to the ability to use speech for effective communication in everyday situation. During communication, intelligibility is a measure of how comprehensive is

speech in a given condition. Unintelligible speech is predominantly seen in individuals with cleft lip and palate.

Aim of the study is to rate the speech intelligibility of repaired cleft lip and palate children and it was mainly conducted to find whether there is any discrepancy in rating by SLPs and Non-SLPs. Speech samples were obtained by using general conversation, counting and repetition. Recording was done using voice recorder.

Intelligibility rating was obtained speech samples were done by SLPs and Non-SLPs with a 5-point rating scale developed by NTID. And the results shows that there is significant difference between SLPs and Non SLPs in the rating of speech intelligibility. This study was targeted to analyze the difference in scoring by trained and untrained professionals by using perceptual methods.

Overall results shows high significant difference when rating scores were compared across SLPs and non SLPs.

### **Limitation of the Study**

- 1) Sample size was small (only 20 subjects were taken for the study)
- 2) Exploratory study requires more control.

### **Further Recommendation**

- 1) Study could be done with a greater number of subjects.
- 2) Mothers of the subjects could also be included as examiners.
- 3) Children of same age group could be considered.

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### **References**

- Andrew, H., George, G., & Kim, B. (2014). The impact of palatal repair before and after 6 months of age on speech characteristics. *International journal of pediatric otolaryngology*, 78 (5), 787-798
- Baykul, T., Aydin, M, A., & Ozarslan, M . M. (2009). Articulation performance of patients wearing obturators with different buccal extension designs.3 (3), 185 -90.
- Chari, P. S. & Raghunathan, N. (1995). Effects of variation of the timing of palatal repair on nasality of speech in complete cleft lip and palate children. *Journal of the Indian Society of Pedodontics and Preventive Dentistry*,17 (4), 146 -149
- Fukushiro, A. P., Ferlin, F. & Yamashita, R. P.: (201 5). Influence of pharyngeal flap surgery on nasality and nasalance scores of nasal sounds production in individuals with cleft lip and palate. 27(6) ,584-587.

Gopalakrishna, A. & Agrawal, K. (2010). A Status report on management of cleft lip and palate in India. Indian journal of plastic surgery,43(1),66-75.

Ghorab, S., de Farooq, M. U. (2013). Palatal lining prosthesis and Velopharyngeal insufficiency: preliminary report. Acta medical academy, 42 (1),55-60.

Hohlfeld, J & Cherpillod, J. (2006). Speech outcome after cranial based pharyngeal flap in children born with total cleft, cleft palate, or primary velopharyngeal insufficiency. Journal of oral maxillofacial surgery, 64(12),1736-42.




James. D. & Sidman, M. (2015). Closure of palatal fistulae Pediatric Surgery of the Oral Cavity - Part 2, 26 (3) ,161-167

Konst, E. & Hanny. (2000). An intelligibility assessment of toddlers with cleft lip and palate who received and did not receive presurgical infant orthopaedic.

Konst, E., Rietveld, T. & Peters, H. (2003). Use of a perceptual Evaluation instrument to assess the effects of infant orthopedics on the speech of toddlers with cleft lip and palate. Cleft lip and craniofacial journal,40(6), 597-605.

Kummer & Ann. (2001). Cleft lip and craniofacial anomalies: effect on speech and resonance

Mitali, & Alex (2015). Limited chances of speech improvement after late cleft palate repair Journal of Craniofacial Surgery, 26(4), p. 1182-1185

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