

Is telepractice effective in speech therapy for children with cleft lip and palate during the COVID-19 pandemic?

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Background: The ongoing COVID-19 pandemic and the current shortage of speech-language pathologists in Thailand have limited access to speech services for children with cleft palate with or without cleft lip (CP±L). A combination of telepractice (TP) and face-to-face therapy could address the lack of continuous service and improve accessibility to speech therapy providers. This study aimed to compare the percentage of consonants correct (PCC) before and after speech therapy in children with CP±L.

Methods: This study included 19 children with CP±L, aged 5 to 13 years, who underwent primary cheiloplasty and palatoplasty. A perceptual assessment was conducted using the Thai Speech Parameters for Patients with Cleft Palate in a Universal Reporting System to evaluate speech before and after therapy. The intervention consisted of five 30-minute face-to-face speech therapy sessions and fifteen 30-minute TP sessions, totaling twenty sessions. Paired *t*-tests were used to analyze the mean differences in PCC for pre- and post-articulation errors, as well as caregiver satisfaction levels at the conclusion of the evaluation period.

Results: Children with CP±L exhibited a significant increase in PCC; the mean difference (standard deviation, SD) was 9.36 (11.87), with a 95% confidence interval (CI) of 3.64 to 15.08 at the word level, and a mean difference (SD) of 13.25 (13.71), with a 95% CI of 6.65 to 19.86 at the sentence level. Caregivers rated their satisfaction as excellent.

Conclusion: The integration of TP with traditional face-to-face speech therapy has proven to be a highly effective approach for reducing articulation errors in children with CP±L. Additionally, this method was well-suited for the constraints imposed by the COVID-19 pandemic.

Abbreviations: CI, confidence interval; CP±L, cleft palate with or without cleft lip; PCC, percentage of consonants correct; SD, standard deviation; SLPs, speech-language pathologists; TP, telepractice

Keywords: Articulation disorders / Cleft palate / Epidemics / Speech therapy

INTRODUCTION

Cleft palate with or without cleft lip (CP±L) is a congenital mal-

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formation that develops during the first trimester of pregnancy [1]. In Thailand, the prevalence of CP±L is 2.14 per 1,000 live births [2]. Although surgery can enhance facial appearance, many children with this condition continue to face persistent speech difficulties, including issues with articulation (13% to 88.56%), resonance (55% to 43.26%), and voice disorders (19.13% to 41%) [3-6]. These challenges necessitate ongoing speech-language therapy interventions.

A shortage of speech therapists poses a significant challenge in many developing countries. To tackle this issue, several strategies have been implemented for children with cleft palate.

These include summer camps [7], telepractice (TP) in Mexico [8], and parent-implemented interventions in South Korea [9]. The Khon Kaen Community-based Speech Therapy Model had been developed in Thailand [10] and adapted for use in Laos [11].

This study aimed to compare the percentage of consonants correct (PCC) before and after a combined TP and face-to-face speech therapy intervention for children with CP ± L.

METHODS

This study had a pre- and post-prospective design (Fig. 1). This research received approval from the Committee for Ethics in Human Research at Khon Kaen University (HE654002: date of approval April 22, 2022). All caregivers and subjects provided written informed consent. The sample size was calculated to achieve a 95% confidence interval with a type I error rate of 0.05 and a type II error rate of 0.2, accounting for a 20% dropout rate.

Participants

Children with CP ± L who registered at Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, and had already undergone primary cheiloplasty and/or palatoplasty were included in this study. The inclusion criteria were children with CP ± L aged 5–13 years old who exhibited articulation errors. The exclusion criteria included children with CP ± L who had

fewer than two articulation errors (excluding /r/, as this is a common sound error among Thai children without specified age ranges for acquisition), bilateral hearing loss greater than 40 decibels, or any disability that affects learning or global developmental delays. A total of 19 children participated in the study. Two speech-language pathologists (SLPs) provided the speech therapy. To minimize selection bias, the children with CP ± L were randomly assigned to receive therapy from either SLP1 (SD) or SLP2 (SC).

Tools

The perceptual speech assessment included. First, the full standard articulation test (Thai Speech Parameters for Patients with Cleft Palate in a Universal Reporting System) was utilized to evaluate word and sentence levels [12]. This test was employed for both pre- and post-perceptual assessments to resonance, speech understandability, speech acceptability, and facial grimace. Second, the articulation screening test [13] comprised four connected sentences encompassing all Thai consonants and accompanied by pictures, was conducted to elicit speech outcomes at the connected speech level. Third, the Utah Test of Language Development [14] was used. This test is a language screening evaluation that assesses both expressive and receptive language skills based on a child’s age. Fourth, the satisfaction questionnaire consisted of 10 questions. Satisfaction scores were rated on a scale from 1 to 5, with 5 indicating “very satisfied,” 4 “satisfied,” 3 “neutral,” 2 “unsatisfied,” and 1 “very unsatisfied.”

Assessment

Participants were assessed using perceptual evaluation through the Thai Speech Parameters for Patients with Cleft Palate in a Universal Reporting System, along with an articulation screening test, both before and after speech therapy. Evaluations were conducted based on the consensus of two SLPs, each with over 10 years of experience in speech therapy for cleft lip and palate. In cases of disagreement, a third senior SLP with more than 35 years of experience would discuss and establish a consensus on the evaluation. Caregiver satisfaction was measured using a questionnaire (internal consistency coefficient or Cronbach’s alpha = 0.54) administered by a research assistant following the intervention.

Intervention

The combination of TP and face-to-face speech therapies incorporates multiple approaches: the traditional articulation approach (focusing on placement and manner techniques), phonological awareness, and specific techniques for correcting

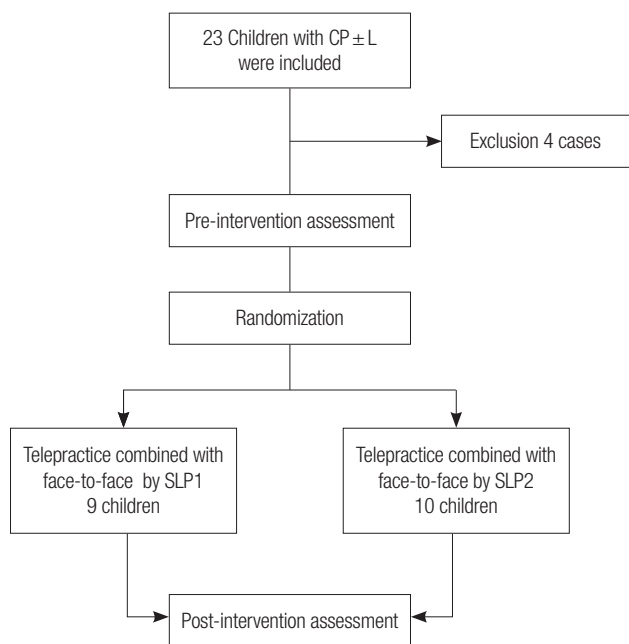


Fig. 1. Study design. CP±L, cleft palate with or without cleft lip; SLP, speech and language pathologist.

compensatory articulation disorders. Speech therapy sessions were structured to include 30-minute training periods. This regimen comprised 5 monthly face-to-face sessions and 15 TP sessions conducted weekly over 5 months. The TP was facilitated through the Zoom meeting application, providing real-time audio and video interaction with SLPs. This setup enabled immediate correction of pronunciation and on-the-spot advice.

Statistical analysis

Data were analyzed using the IBM SPSS Statistics version 28.0.1.0 (142), which provided descriptive statistics and facilitated the comparison of the number of articulation errors before and after therapy using the paired *t*-test.

RESULTS

The general characteristics of 19 children with CP ± L who underwent speech therapy by SLP1 and SLP2 are shown in Table 1. No statistically significant differences were noted in the characteristics of children who received speech therapy from SLP1 versus SLP2. Pre- and post-speech and language issues are presented in Table 2. Improvements were noted in resonance, speech understandability, speech acceptability, and facial grimace following speech therapy. Based on the Shapiro-Wilk test for normality, the paired *t*-test was conducted to detect differences in PCC before and after speech therapy. The results revealed that PCC scores significantly increased following the therapy, as shown in Table 3. The majority of caregivers reported high satisfaction levels across all aspects of the project, as

Table 1. General characteristics of children with CP ± L

Information	SLP1	SLP2	<i>p</i> -value ^{b)}
Sex			0.26
Male (n = 11)	4 (36.4)	7 (63.6)	
Female (n = 8)	5 (62.5)	3 (37.5)	
Age group ^{a)}			0.26
5–6 yr (n = 6)	2 (33.3)	4 (66.7)	
7–8 yr (n = 5)	2 (40.0)	3 (60.0)	
9–10 yr (n = 5)	2 (40.0)	3 (60.0)	
11–13 yr (n = 3)	3 (100)	0	
Diagnosis			0.33
CP (n = 5)	4 (80.0)	1 (20.0)	
Lt. unilateral CP ± L (n = 4)	1 (25.0)	3 (75.0)	
Rt. unilateral CP ± L (n = 4)	2 (50.0)	2 (50.0)	
Bilateral CP ± L (n = 6)	2 (33.3)	4 (66.7)	

Values are presented as number (%).

CP ± L, cleft palate with or without cleft lip; SLP, speech-language pathologist; CP, cleft palate; Rt., right; Lt., left; SD, standard deviation.

^{a)}Mean ± SD = 8.45 ± 2.55; ^{b)}Chi-square test.

shown in Table 4, with average scores ranging from 4.42 to 5 out of 5.

DISCUSSION

Unilateral CP ± L was the most prevalent type, accounting for 42.1% of cases (Table 1). This finding is consistent with previous research, which reported rates between 44.3% and 71.8% [15-17]. Notably, men were more frequently affected, with a prevalence of 57.89%, aligning with findings reported in the established literature [17,18].

The high prevalence of resonance abnormalities observed in this study (Table 2) may be partially due to the inclusion criteria, which mandated that participants have at least two articulation errors. As a result, children with resonance disorders affecting their articulation were more likely to be included. This aligns with findings from previous research [19,20]. Hypernasality often stems from velopharyngeal insufficiency, a condition that can persist even after palate repair surgery. After the intervention, there was a significant reduction in resonance abnormalities among participants—73.29%, down from 89.47%.

Table 2. Pre- and post-intervention speech and language characteristics

Assessment ^{a)}	Normal (%)	Abnormal (%)	95% CI ^{b)}	<i>p</i> -value ^{c)}
Language	63.16	36.84		
Voice			-1.11 to 1.22	
Pre-intervention	78.95	21.05		
Post-intervention	73.68	26.32		
Resonance				0.23
Pre-intervention	10.53	89.47		
Post-intervention	26.32	73.68		
Speech understandability				0.15
Pre-intervention	26.32	73.68		
Post-intervention	63.16	36.84		
Speech acceptability				<0.01
Pre-intervention	26.32	73.68		
Post-intervention	57.89	42.11		
Facial grimace				0.16
Pre-intervention	10.53	89.47		
Post-intervention	15.79	84.21		

GIRBAS, grade, instability, roughness, breathiness, athenia, strain; WNL, within normal limits; CI, confidence interval.

^{a)}Voice (GIRBAS scale): 0 = normal voice, 1–6 = mild voice disorders, 7–12 = moderate voice disorders, 13–18 = severe voice disorders. Resonance: -1 = hyponasality, 0 = WNL, 1 = mild, 2 = moderate, 3 = severe. Speech understandability: 0 = WNL, 1 = speech is occasionally hard to understand, 2 = speech is often hard to understand, 3 = speech is hard to understand most or all of the time. Speech acceptability: 0 = WNL, 1 = speech deviates from normal to a mild degree, 2 = speech deviates from normal to a moderate degree, 3 = speech deviates from normal to a severe degree. Facial grimace: 0 = WNL, 1 = ala, 2 = nasal bridge, 3 = forehead; ^{b)}Paired *t*-test; ^{c)}Chi-square.

Table 3. Comparison of the percentage of consonants correct pre- and post-intervention

Articulation errors	Pre-test		Post-test		Pre- and post-test ^{a)}		
	Range	Mean ± SD	Range	Mean ± SD	Mean difference	SD	95% CI
Word	29.63 to 92.59	61.79 ± 17.29	33.33 to 96.30	71.15 ± 16.91	9.36	11.87	3.64 to 15.08
Sentence	18.52 to 85.19	57.11 ± 18.90	37.04 to 96.30	70.37 ± 14.66	13.25	13.71	6.65 to 19.86
Connected speech	22.22 to 92.59	69.20 ± 17.55	48.15 to 96.30	73.10 ± 13.74	3.90	11.48	-1.64 to 9.43

SD, standard deviation; CI, confidence interval.

^{a)}Paired *t*-test.

Table 4. Caregivers' satisfaction

Questionnaire	Satisfaction score (%) ^{a)}					
	5	4	3	2	1	Mean
1. Telepractice is effective for correcting articulation errors.	42.11	47.37	10.53	0	0	4.42
2. Telepractice increases the convenience of speech therapy services.	78.95	21.05	0	0	0	4.79
3. The duration of each telepractice session is appropriate.	84.21	15.79	0	0	0	4.84
4. The tool is suitable for speech correction.	89.47	10.53	0	0	0	4.89
5. The Zoom meeting application is easy to use for telepractice.	78.95	21.05	0	0	0	4.79
6. Stability of the audio-visual system in telepractice.	68.42	31.58	0	0	0	4.68
7. Convenience in contacting and sending information through the Line application.	89.47	10.53	0	0	0	4.89
8. Telepractice reduces the travel time required to access speech therapy services.	94.74	5.26	0	0	0	4.95
9. Telepractice reduces the cost of receiving speech therapy services.	100	0	0	0	0	5.00
10. Telepractice is suitable for speech correction during the COVID-19 pandemic.	89.47	10.53	0	0	0	4.89

^{a)}Score: 5 = very satisfied, 4 = satisfied, 3 = neutral, 2 = unsatisfied, 1 = very unsatisfied.

This improvement likely resulted from the correction of consonant accuracy and articulation errors. By mastering accurate phoneme placement and production, participants were able to address their resonance challenges [21].

Voice disorders affected 21.05% of participants (Table 2), consistent with previous studies [6]. However, this percentage increased to 26.32% post-intervention, likely due to vocal misuse by four participants (T08Z, T11Z, T13A, T16Z). Children with cleft palate exhibited poorer speech intelligibility, acceptability, and increased facial grimacing compared to their peers. After 5 months of speech therapy, there was noticeable improvement in these areas, primarily attributed to enhanced consonant accuracy and articulation.

Children with CP ± L demonstrated higher rates of speech intelligibility, acceptability, and facial grimacing compared to controls, as shown in Table 2. After 5 months of speech therapy, there was a significant improvement in speech intelligibility and acceptability, along with a reduction in facial grimacing. These enhancements were linked to improved consonant accuracy and articulation [21].

Trilling errors were the most common articulation errors in both pre- and post-intervention assessments, consistent with findings in typically developing children [22-24]. Functional misarticulations were significantly more prevalent among chil-

dren with CP than among those with other speech and language disorders, with rates ranging from 36.84% to 73.68% [25].

The intervention led to significant improvements in the PCC across word, sentence, and connected speech levels, demonstrating a decrease in articulation errors. The results showed no significant differences in speech outcomes across different age groups; however, children aged 9 years and older generally achieved higher PCC scores. These findings suggest that to fully evaluate the long-term effects of this intervention, extended follow-up periods are necessary [11,26]. Several factors affected the outcomes of the study, including internet connectivity, background noise, and parental cooperation. Challenges such as poor internet connections and noisy environments were addressed through collaboration between SLPs and parents. However, scheduling conflicts and limited opportunities for parental training presented ongoing challenges. To enhance the effectiveness of future studies, it is crucial to proactively address these issues.

Caregivers expressed high satisfaction with TP, with average scores ranging from 4.42 to 5. They highlighted the reduced costs, time, and travel as significant advantages. Additionally, Zoom received a commendation for its user-friendliness (Table 4).

The main findings of this study indicated that TP was effective during the COVID-19 pandemic, addressing shortages of

SLPs and safety concerns. Although the sample size was statistically calculated based on previous findings, the small number of participants may lead to wide confidence intervals (95% confidence interval) in some cases. For future research, a larger sample size should be considered to enhance the generalizability of the results.

The combination of TP and face-to-face speech therapy effectively reduced articulation errors in children with cleft palate during the COVID-19 pandemic. This approach successfully addressed the challenges posed by social distancing restrictions and limited resources in Thailand.

NOTES

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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Ethical approval

This research was approved by the Committee of the Center for Ethics in Human Research, Khon Kaen University (HE654002).

Patient consent

All caregivers and subjects gave written informed consent after receiving complete information about the research.

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Writing - original draft: Sumita Duangprasert. Writing - review & editing: Sumita Duangprasert, Sasalaksamon Chanachai, Benjamas Prathanee.

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