Types of Articulation Errors in Individuals with Cleft Lip and Palate

Benjamas Prathanee BSc, MA, PhD*,
Tawitree Pumnum BSc*, Cholada Seepuaham BSc*

* Department of Otorhinolaryngology, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

Objective: To identify types of articulation errors in speech camp.

Material and Method: Sixteen children with cleft palate with or without lip and articulatory defects in Mahasarakham Province and surrounding area enrolled for 3-day intensive speech camp that was held in Srinagarind Hospital. Assessments of speech and language problems: articulation, resonance, nasal emission/turbulence, voice, and intelligibility were performed. Type of articulation errors were grouped based on standard guidelines.

Results: Velar production was the most common types, both at word (75%) and sentence levels (93%) followed by glottal and pharyngeal productions at word level testing (43.75% and 43.75%) and at sentence level (37.5% and 18.75%), respectively.

Conclusion: Abnormal backing of oral targets was the most common speech type. Further study and early prevention for articulation disorders are needed.

Keywords: Cleft speech type, Cleft speech characteristics, Speech disorders

The worldwide incidence of cleft lip/palate is between 0.30 and 2.65/1,000 live births(1). Cleft lip/palate is indeed a major public health concern in Thailand, where the incidence of cleft lip/palate is between 1.10 and 2.49/1,000 live births(2). Prevalence of cleft lip/palate by the numbers on the birth certificate and the registry were 0.11 vs. 0.71; 0.30 vs. 0.51; 0.35 vs. 0.66, respectively(3-5). Interestingly, most of the affected persons live in the Northeast, where the annual occurrence of cleft lip/palate is about one in 745 live births each year(1).

Surgery is the first and most critical treatment to relieve social and physical abnormalities for children with cleft palate; however, the needs of patients with clefts extend beyond surgical repair including corrections of speech and language disorders, malocclusion, hearing abnormalities etc. Articulation errors are very common in cleft speech defect. Articulation disorders in cleft are included either functional or phonological articulation disorders or adaptive oral misarticulation(6,7). The prevalence of articulation errors, particularly compensatory articulation disorders (CAD) is 44-63%(8-10) and is higher one in (Not clear, needs revision) recent study (88.56%; 95% CI = 84.47-92.65)(11).

CAD is known as a common behavior secondary to velopharyngeal insufficiency (VPI) or articulator defects in cleft palate which include dysfunction not only of the velopharyngeal sphincter, but of the entire vocal tract(12) such as plosive sounds e.g./t/or/p/ might be attempted by substituting a glottal stop or pharyngeal stop. Articulation patterns are usually referred to compensatory articulation disorders or cleft speech types. CAD usually decreases intelligibility. The longer the time passes the age of articulation development, the more difficulty it is to correct and the longer period of speech therapy is required(13,14).

Phonetic disorders in cleft occur when the movements of the articulators, such as the lips, tongue, palate or resonating cavities deviate from normal articulations. Compensations such as a glottal stop, velar, pharyngeal production would be considered phonetic, as the child attempts to produce the sound in an alternative manner to compensate for the inability to establish oral pressure because of inadequate velopharyngeal function. Because the glottal, pharyngeal and velar productions reflect an obvious and productive compensation, these have been viewed as phonetic and articulation which becomes the main
topic in intervention. Most children with cleft continue
to produce CAD despite the early and effective repair.
There might be some other factors other than the
inability to establish sufficient oral air pressure is
contributing to the development and maintenance of
these articulatory patterns(12,15). CAD is a phonological
disorder rather than phonetic, the same types of
phonological process errors as with younger, typically
developing children(16). CAD is considered as a
phonological disorder, that is linguistically based and
more related to higher levels of linguistic organization
(rule level) rather than phonetic (cognitive peripheral
level)(14). The phonological rules resulted in faster
learning of the target productions and more rapid
incorporation into the language rules and thus more
immediate carry over into conversational speech(17).
Therefore, recent study focused on speech therapy
based on the linguistic system of each child, and
considered the speech sound production as an integral
component of higher levels of language organization
for intervention. The result indicated that it was a valid
and efficient method for providing speech therapy in
cleft palate children with compensatory articulation
disorder(18).

In Thailand, where pathologists (SLPs) in
speech and language is lacking and speech services is
one of the critical areas of cleft care(19-22). Speech camp
was modified for providing speech services for children
with cleft, particularly in the northeast where the high
prevalence of cleft in Thailand exists. The Community-
Based Speech Therapy Model: For Children with Cleft
Lip/palate was developed by combining the principles
of Community-Based Rehabilitation (CBR), Primary
Health Care (PHC) and institutional medical approaches
for reaching and treating speech disordered children
with cleft lip and/or palate was a model that had been
launched in 2011-2012(23).

The aim of the present study was to identify
types of articulation errors in speech camp, one part of
the “Khon Kaen Community-Based Speech Therapy
Model”.

Material and Method

Study design

This study was a cross-sectional study.

Participants

Twenty children aged 3½-8 years with cleft
palate and or without cleft lip (CP ± L) in target areas
of the “Khon Kaen Community-Based Speech
Therapy Model” (districts of Borabue, Chiengyuen,
Kantharawichai, Wapiprathum, Mueng, Kosumphisai)
were included. Four of them were excluded from the
study because of migration and could not participate
in the project (Patient No. C13); complicated physical
problems (Patient No. C14, C15) and another had
only a cleft lip and no articulation defects (C17).
Sixteen children with CP ± L were in the present study.

Setting

Assessments of speech and language
problems were performed in a Speech clinic, Srinagarind
Hospital, Khon Kaen University, Khon Kaen.

According to the Helsinki Declaration (HE531358), the
Ethics Committee of Khon Kaen University reviewed
and approved (October 22, 2010) the research protocols.
Children were assessed for baseline parameters at the
intensive 3-day speech camp including.

Ear, nose throat examination was performed
by an ENT physician; tympanogram and audiometry
(Audiometer: acoustic analyzer 1,200) by an audiologist.

Oral examination and speech and language
abilities with perceptual assessment of speech for
cleft using the Thai Universal Parameters of Speech
Outcomes for People with Cleft Palate were investigate
by a SLP. Outcomes were summarized by 2 speech
and language pathologists’ consensus. Speech character-
istics were assessed as follows: articulation,
resonance, nasal emission/turbulence, voice, and intelli-
gibility. Articulation patterns were classified by
following standard universal guidelines(24). These
included both single word and sentence levels as
follows:

1) Abnormal backing of oral targets to post-
uvular place (pharyngeal & glottal sounds);
2) Abnormal backing of oral targets, but place
remains oral (mid-dorsum palatal & velar);
3) Nasal fricative (phoneme specific & not
phoneme specific);
4) Nasalized voiced pressure consonants;
5) Nasal consonant for oral pressure
consonant;
6) Weak oral pressures;
7) Other oral misarticulations;
8) Developmental articulation
9) Phonological errors

Nasometry (Nasometer II 6450, Kaypentax)
was used for assessing the average nasalance scores
and compared to the average nasalance scores of a
standard of 3 Thai passages(25).

Language screening test (adapted to Thai
Early Language Milestone)(26).
Analysis

The main outcome was the pattern of articulation errors from pre-articulation test (the Thai Universal Parameters of Speech Outcomes for People with Cleft Palate(27)) in speech camps. Oral examination described characteristics of oronasal configurations: facial grimace was scored as 1: a wrinkle in the floor of the nose alar; 2: a wrinkle in the bridge of the nose; and 3: a frown and wrinkle in the forehead. Perceptual assessments were also scored: resonance as normal (0), hyponasality (-1), mild hypernasality (+1), moderate hypernasality (+2), severe hypernasality (+3); nasal emission/turbulence as none, visible, audible; voice as normal and abnormal; intelligibility as intelligibility, intelligibility if the topic is known; unintelligibility; language was scored as pass and delay, and nasometry gave a percentage of the nasalance score.

Results

Sixteen children with cleft lip or/and palate clefts in Mahasarakham Province were included in this study. Cleft type proportion of left unilateral cleft lip and palate: cleft palate: bilateral cleft lip and palate was 7: 6: 3. Demographic characteristics of these children are shown in Table 1.

Characteristics of speech and language disorders of children with cleft lip and/or palate are presented in Table 2. Prevalence of language delay was 18.75%; a resonance disorder (hypernasality from velopharyngeal insufficiency) was 37.50%; voice abnormality was 25%.

The percentages and numbers of articulation errors of individuals with cleft at word level were displayed in Table 3. The overall percentages and numbers of articulation patterns at sentence level were showed as Table 4. The common patterns of articulation errors (with exception developmental errors that often found in typically children) in individual with cleft were other oral misarticulation, velar, and pharyngeal productions, respectively.

Prevalence of each articulation patterns for all children (16 participants) with cleft was presented in Table 5. With exception and other oral misarticulations, the high prevalence of cleft articulation patterns, both word and sentence level, were orderly velar, pharyngeal productions, and nasalized voice pressure consonants, respectively.

Discussion

Most participants in this study were in preschool age (<7 years old) (Table 1). There were 5 children at school age (>7 years old) that were beyond normal articulation development following Thai articulation norms(28). This would be more difficult and
Table 2. Characteristics of oral examination, speech and language of children with CP + L.

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Facial grimace</th>
<th>Language</th>
<th>Intelligibility</th>
<th>Resonance</th>
<th>Voice</th>
</tr>
</thead>
<tbody>
<tr>
<td>C01</td>
<td>None</td>
<td>Pass</td>
<td>Intelligibility</td>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>C02</td>
<td>None</td>
<td>Pass</td>
<td>Intelligibility</td>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>C03</td>
<td>None</td>
<td>Pass</td>
<td>Intelligibility</td>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>C04</td>
<td>None</td>
<td>Pass</td>
<td>Intelligibility</td>
<td>0</td>
<td>Abnormal</td>
</tr>
<tr>
<td>C05</td>
<td>None</td>
<td>Pass</td>
<td>Intelligibility</td>
<td>+1</td>
<td>Normal</td>
</tr>
<tr>
<td>C06</td>
<td>None</td>
<td>Pass</td>
<td>Intelligibility</td>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>C07</td>
<td>None</td>
<td>Pass</td>
<td>Intelligibility</td>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>C08</td>
<td>None</td>
<td>Delayed</td>
<td>Intelligibility</td>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>C09</td>
<td>None</td>
<td>Delayed</td>
<td>Intelligibility</td>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>C10</td>
<td>1</td>
<td>Pass</td>
<td>*Mild unintelligibility</td>
<td>+2</td>
<td>Abnormal</td>
</tr>
<tr>
<td>C11</td>
<td>1</td>
<td>Delayed</td>
<td>Intelligibility</td>
<td>+1</td>
<td>Normal</td>
</tr>
<tr>
<td>C12</td>
<td>None</td>
<td>Pass</td>
<td>Intelligibility</td>
<td>0</td>
<td>Normal</td>
</tr>
<tr>
<td>C16</td>
<td>1</td>
<td>Pass</td>
<td>*Mild unintelligibility</td>
<td>+2</td>
<td>Abnormal</td>
</tr>
<tr>
<td>C18</td>
<td>1</td>
<td>Pass</td>
<td>Intelligibility</td>
<td>+1</td>
<td>Normal</td>
</tr>
<tr>
<td>C19</td>
<td>None</td>
<td>Pass</td>
<td>*Mild unintelligibility</td>
<td>+2</td>
<td>Abnormal</td>
</tr>
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<td>Intelligibility</td>
<td>0</td>
<td>Normal</td>
</tr>
</tbody>
</table>

* = Speech had intelligibility if assessor knew the topic of conversation or question that asked child

take a longer duration for articulatory correction\(^{13,14}\), particularly child No. C10 who had the most number of articulatory errors (Table 3). Intensive speech correction should be applied in a short-term period before he/she passes longer complete articulation development. Results of this study indicated that children with cleft and articulation defects or CAD were at risk for delayed speech and language development (18.75% or 3 in 16 children), voice disorders (25% or 4 in 16 children), resonance disorders (37.5% or 5 in 16 children). These supported the previous studies but lower in prevalence of language delay\(^{9,29-32}\). Prevalence of voice disorders and resonance disorders (hypernasality) were in range of previous results (5.5-20.8%)\(^{13,15}\) and 20-40%\(^ {6,36-41}\), respectively. These, particularly in cases of more severe resonance disorders (moderate or +2 levels in C10, C16 and C19), resulted in mild unintelligibility (Table 2).

Prevalence from the present study was from children with cleft and CAD or articulatory defects, which could not be inferred from general population with cleft. For treatment implication, it would be implied and planned for speech therapy of communication disorders in target populations. For example C10 had the most number of articulatory defects and severe resonance disorders (+2) (Table 2) which might have resulted from maladaptive learning behavior in CAD. Speech and language pathologist should try to modify or correct CAD and follow-up speech problems (resonance disorders) after short-term therapy (e.g., 6-12 months). If CAD is corrected, resonance disorder resulting from maladaptive learning behavior will disappear\(^ {6,7}\).

According to articulation patterns in clefts, developmental errors (68.75% at word level and 62.5% at sentence level) and other oral misarticulation (100% at both levels) were the highest prevalence (Table 5). Developmental errors will be spontaneously acquired with growth. For other oral misarticulation, 8.6-12% of normal kindergarteners had articulatory defects\(^ {42,43}\).

From results of the present study, prevalence of other oral misarticulation or function articulation disorders in clefts was higher than children in the general population. It presented that children with cleft population were at higher risk for other oral misarticulation than the general population. With the exception of developmental errors and other oral misarticulation types, abnormal backing of oral targets but place remains oral (velar production) was the most common type, both at word (75%) and sentence levels (93%), followed by abnormal backing of oral targets to post-uvular place, glottal and pharyngeal productions. These confirmed that abnormal backing was the most common speech pattern in clefts and support previous ones\(^ {6,7,13,44}\). A phonological error (12.5%) was found in clefts and agreed with a previous study and indicates that it should be correct early with an effective program in speech intervention\(^ {18}\). However, study of cleft speech types is not available in Thailand. These results
### Table 3. Overall percentages (numbers) of articulation patterns of cleft speech: word level

<table>
<thead>
<tr>
<th>No.</th>
<th>Oral targets to post-uvular place*</th>
<th>Oral targets, but place remains oral**</th>
<th>Nasalized voiced pressure consonants</th>
<th>Other oral misarticulations</th>
<th>Developmental articulations</th>
<th>Phonological errors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pharyngeal</td>
<td>Glottal</td>
<td>Velar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C01</td>
<td></td>
<td></td>
<td>78.78 (7)</td>
<td>11.11 (1)</td>
<td>11.11 (1)</td>
<td></td>
<td>100 (9)</td>
</tr>
<tr>
<td>C02</td>
<td></td>
<td></td>
<td>47.05 (8)</td>
<td>41.17 (7)</td>
<td>11.76 (2)</td>
<td></td>
<td>100 (17)</td>
</tr>
<tr>
<td>C03</td>
<td>23.53 (4)</td>
<td>11.76 (2)</td>
<td>23.53 (4)</td>
<td>23.53 (4)</td>
<td>17.65 (3)</td>
<td></td>
<td>100 (17)</td>
</tr>
<tr>
<td>C04</td>
<td>25.92 (7)</td>
<td>29.63 (8)</td>
<td>33.33 (9)</td>
<td>11.11 (3)</td>
<td></td>
<td></td>
<td>100 (27)</td>
</tr>
<tr>
<td>C05</td>
<td>3.70 (1)</td>
<td>22.22 (6)</td>
<td>7.41 (2)</td>
<td>51.85 (14)</td>
<td>7.41 (2)</td>
<td>7.41 (2)</td>
<td>100 (27)</td>
</tr>
<tr>
<td>C06</td>
<td></td>
<td></td>
<td>25.00 (5)</td>
<td>70.00 (14)</td>
<td>5.00 (1)</td>
<td></td>
<td>100 (20)</td>
</tr>
<tr>
<td>C07</td>
<td>5.88 (1)</td>
<td>11.76 (2)</td>
<td>64.70 (11)</td>
<td>17.65 (3)</td>
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<td>100 (17)</td>
</tr>
<tr>
<td>C08</td>
<td>11.76 (2)</td>
<td>17.65 (3)</td>
<td>70.59 (12)</td>
<td></td>
<td></td>
<td></td>
<td>100 (17)</td>
</tr>
<tr>
<td>C09</td>
<td></td>
<td></td>
<td>100.00 (3)</td>
<td></td>
<td></td>
<td></td>
<td>100 (3)</td>
</tr>
<tr>
<td>C10</td>
<td>6.89 (2)</td>
<td>34.48 (10)</td>
<td>10.34 (3)</td>
<td>37.93 (11)</td>
<td></td>
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<td>100 (29)</td>
</tr>
<tr>
<td>C11</td>
<td>5.26 (1)</td>
<td>36.84 (7)</td>
<td>10.53 (2)</td>
<td>31.58 (6)</td>
<td>15.79 (3)</td>
<td></td>
<td>100 (19)</td>
</tr>
<tr>
<td>C12</td>
<td>6.25 (1)</td>
<td>37.50 (6)</td>
<td>31.25 (5)</td>
<td>31.58 (6)</td>
<td>25.00 (4)</td>
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<td>100 (16)</td>
</tr>
<tr>
<td>C16</td>
<td>9.09 (1)</td>
<td>9.09 (1)</td>
<td>18.18 (2)</td>
<td>63.63 (7)</td>
<td></td>
<td></td>
<td>100 (11)</td>
</tr>
<tr>
<td>C18</td>
<td></td>
<td></td>
<td>100.00 (3)</td>
<td></td>
<td></td>
<td></td>
<td>100 (3)</td>
</tr>
<tr>
<td>C19</td>
<td>7.14 (1)</td>
<td>35.71 (5)</td>
<td>7.14 (1)</td>
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<td>20.00 (2)</td>
<td>60.00 (6)</td>
<td>10.00 (1)</td>
<td></td>
<td></td>
<td>100 (10)</td>
</tr>
</tbody>
</table>

* = Abnormal backing of oral targets to post-uvular place; ** = Abnormal backing of oral targets, but place remains oral; # = Nasalized voiced pressure consonants; ## = Phonological errors
Table 4. Overall percentages (numbers) of articulation patterns of cleft speech: sentence level

<table>
<thead>
<tr>
<th>No.</th>
<th>Oral targets to post-uvular place*</th>
<th>Oral targets, but place remains oral**</th>
<th>Nasalized voiced pressure consonants</th>
<th>Other articulations</th>
<th>Developmental articulations</th>
<th>Phonological errors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pharyngeal</td>
<td>Glottal</td>
<td>Velar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C01</td>
<td>50.00 (5)</td>
<td>7.14 (1)</td>
<td>40.00 (4)</td>
<td>10.00 (1)</td>
<td>100 (10)</td>
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</tr>
<tr>
<td>C02</td>
<td>28.57 (4)</td>
<td>26.32 (5)</td>
<td>22.72 (5)</td>
<td>4.54 (1)</td>
<td>100 (22)</td>
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<tr>
<td>C03</td>
<td>15.78 (3)</td>
<td>75.00 (12)</td>
<td>7.14 (1)</td>
<td>100 (19)</td>
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<tr>
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<td>4.51 (1)</td>
<td>47.37 (9)</td>
<td>4.54 (1)</td>
<td>100 (22)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>C05</td>
<td>57.89 (11)</td>
<td>12.50 (2)</td>
<td>12.50 (1)</td>
<td>100 (19)</td>
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<tr>
<td>C06</td>
<td>12.50 (1)</td>
<td>75.00 (12)</td>
<td>7.14 (1)</td>
<td>100 (16)</td>
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<td></td>
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<tr>
<td>C07</td>
<td>6.25 (1)</td>
<td>75.00 (12)</td>
<td>6.25 (1)</td>
<td>100 (19)</td>
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<td></td>
<td></td>
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<tr>
<td>C08</td>
<td>100.00 (9)</td>
<td>66.67 (4)</td>
<td>66.67 (4)</td>
<td>100 (6)</td>
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<td></td>
<td></td>
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<tr>
<td>C09</td>
<td>33.33 (2)</td>
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<td>14.29 (3)</td>
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<td>C10</td>
<td>4.76 (1)</td>
<td>19.05 (4)</td>
<td>19.05 (4)</td>
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<td>C12</td>
<td>4.76 (1)</td>
<td>57.14 (4)</td>
<td>57.14 (4)</td>
<td>100 (6)</td>
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<td>15.38 (2)</td>
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<td>33.33 (2)</td>
<td>66.66 (4)</td>
<td>66.66 (4)</td>
<td>100 (6)</td>
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<td>4.54 (1)</td>
<td>22.72 (5)</td>
<td>22.72 (5)</td>
<td>100 (22)</td>
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<td>28.57 (2)</td>
<td>100 (7)</td>
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</table>

* = Abnormal backing of oral targets to post-uvular place; ** = Abnormal backing of oral targets, but place remains oral
Table 5. Overall articulation patterns of cleft speech (n = 16)

<table>
<thead>
<tr>
<th>Articulation patterns</th>
<th>Number (Total 16 patients)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Words</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Abnormal backing of oral targets to post-uvular place</td>
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<td>1.1 Pharyngeal</td>
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<tr>
<td>1.2 Glottal</td>
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<tr>
<td>2. Abnormal backing of oral targets, but place remains oral</td>
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<td>2.1 Mid-dorsum palatal</td>
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<td></td>
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<tr>
<td>2.2 Velar</td>
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<tr>
<td>5. Nasalized voiced pressure consonants</td>
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<td>31.25</td>
</tr>
<tr>
<td>7. Other oral misarticulations</td>
<td>16</td>
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</tr>
<tr>
<td>8. Developmental articulations</td>
<td>11</td>
<td>68.75</td>
</tr>
<tr>
<td>9. Phonological errors</td>
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</tr>
<tr>
<td>Sentences</td>
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<tr>
<td>1. Abnormal backing of oral targets to post-uvular place</td>
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</tr>
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<tr>
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<tr>
<td>8. Developmental articulations</td>
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</tr>
<tr>
<td>9. Phonological errors</td>
<td>2</td>
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might be the primary report and can show need for further study and planning for speech therapy in children with clefts.

**Conclusion**

Children with clefts were at risk for other oral misarticulation more than the general population. Abnormal backing of oral targets but place remains oral (velar production) and abnormal backing of oral targets to post-uvular place were the common types of clefts. Further study and planning for speech correction are needed.

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**Potential conflicts of interest**

None.

**References**


ประเภทของการพูดไม่ชัดในผู้ป่วยปากแหว่งพานไหว้

เบญจมาศ พระราชินี, ทวีรชัย ภูมินัน, ชะตา ลิขิตรสิน

วัตถุประสงค์: เพื่อศึกษารูปแบบการพูดไม่ชัดในผู้ป่วยปากแหว่งพานไหว้

วัสดุและวิธีการ: เคสเฉพาะหน้ารายเดียวที่มีปากแหว่งร่วมคด้วยและมีปัญหาการพูดไม่ชัดจำนวน 16 ราย ในจังหวัด

มหาสารคามและพื้นที่ใกล้เคียงที่มีแนวโน้มร่วมคด้วย ทำการประเมินความแตกต่าง

ของการแย่งเสียง ความล้าของเสียง สมรรถนะเสียงเสียงดีทางการสูญเสียงและการพังค์ภาพกิจและขั้นตอนของการพูด

ไม่ชัดตามแนวทางมาตรฐาน

ผลการศึกษา: การพูดไม่ชัดที่ใช้พนักอนันในการออกเสียงทั้งหมดแต่ละอยู่ในปากเป็นรูปแบบที่พาก收拾สุด

ทั้งการทดสอบ

ในระดับคำ (ร้อยละ 75) และระดับประโยค (ร้อยละ 93) ตามด้วยการพูดไม่ชัดที่ใช้ลำดับคำเป็นหลัก

หันในการทดสอบ

ระดับคำ (ร้อยละ 43.75 และ ร้อยละ 43.75) และระดับประโยค (ร้อยละ 37.5 และ ร้อยละ 18.75) ตามลำดับ

สรุป: การพูดไม่ชัดโดยการออกเสียงที่ใช้พานกระชากหลังเป็นรูปแบบที่พาก收拾สุด การศึกษาในอนาคตและการป้องกัน

การพูดไม่ชัดดังเนื่องๆ เป็นผลลัพธ์ใน