

# Cleft Lip and Palate Assessment Form: Medical History, Oral-peripheral Characteristics, Speech Problems

Özlem Ünal-Logacev, Deniz Kazanoğlu<sup>1</sup>, Eren Balo<sup>1</sup>, Ayşe Nemutlu<sup>1</sup>

Department of Speech and Language Therapy, Istanbul Medipol University, School of Health Sciences, Istanbul, <sup>1</sup>Department of Language and Speech Therapy, Anadolu University, Faculty of Health Sciences, Eskisehir, Turkey

## Abstract

**Objective:** The objective of the study is to identify the medical histories, oral-peripheral characteristics and speech problems of children with cleft lip and palate (CLP) or craniofacial anomalies, and eventually create an assessment form that highlights the factors that should be taken into consideration in the examination of those children. **Materials and Methods:** An assessment form was developed and used to assess with a descriptive method the medical history, oral peripheral, speech, and resonance characteristics of children with CLP. The study included 56 (21 females and 35 males) children with CLP. The results are presented as frequency or percentage. **Results:** About 20% of the CLP patients were offspring of consanguineous marriage and about 30% had positive family history of CLP. The major difficulty families experienced was feeding. Hearing impairment at various degrees was reported in 23% of the participants. The presence of cardiovascular, renal, neurological and endocrinological problems, and symptoms addressed in peripheral examination were identified as critical in discriminating syndromic cases. Assessment of the speech skills showed backing to be the most prevalent error among the participants. **Conclusion:** The form that was developed in scope of this study was observed to successfully define the medical history, oral-peripheral characteristics and speech problems of individuals with CLP. The form, however, needs further testing in larger populations and comparison to non-CLP populations.

**Keywords:** Assessment, cleft lip and palate, speech disorders

## INTRODUCTION

Speech and language disorders can occur due to a host of reasons related to many factors such as etiology, associated anatomic disorders, and affected components of the language. Such diverse problems demand different modes of assessment. For instance, disorders, like cleft palate, that develop because of an anatomical impairment, and together with multiple problems, should be extensively evaluated. To that end, a number of studies are conducted in Europe and in the United States to standardize clinical applications.<sup>[1]</sup> The Great Ormond Street Speech Assessment and The Cleft Audit Protocol for Speech-A developed under the Eurocleft project can be named as examples.<sup>[2,3]</sup>

In Turkey, there is no standard assessment form or protocol that can be used for evaluating speech and language in individuals with cleft lip and palate (CLP). The same tools that are used for evaluating various disorders are also used for this purpose, whereas assessment of individuals with CLP should target feeding, respiration, hearing, language, articulation, resonance,

cognition, dental, skeletal (occlusion), esthetic, psychosocial, and academic problems. Furthermore, assessments should allow for discriminating between syndromic and nonsyndromic cases.

Assessment in speech and language therapy is in fact a decision making process for referrals as well as for the mode of therapy.<sup>[4]</sup> To help making the right decisions, the tools used in assessment should be able to both define the externally visible problems and identify the underlying causes which these problems possibly arise from.<sup>[5]</sup> Therefore, any information possibly related to the underlying causes should be considered in the assessment of speech and language disorders associated with CLP.

**Address for correspondence:** Dr. Özlem Ünal-Logacev, Department of Speech and Language Therapy, Istanbul Medipol University, School of Health Sciences, Istanbul, Turkey.  
E-mail: [ologacev@medipol.edu.tr](mailto:ologacev@medipol.edu.tr)

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** [reprints@medknow.com](mailto:reprints@medknow.com)

**How to cite this article:** Ünal-Logacev Ö, Kazanoğlu D, Balo E, Nemutlu A. Cleft lip and palate assessment form: Medical history, oral-peripheral characteristics, speech problems. Turk J Plast Surg 2018;26:156-68.

### Access this article online

#### Quick Response Code:



**Website:**  
<http://www.turkjplastsurg.org>

**DOI:**  
10.4103/tjps.tjps\_27\_18

The purpose of this study is to develop a form – as described later in the methods section – that can be used in the assessment of individuals with CLP and craniofacial anomalies, and to use this form to identify the medical history, oral-peripheral characteristics, as well as speech and resonance characteristics in these individuals. The form is designed to help address the following areas:

1. Discriminating between syndromic and nonsyndromic cases
2. Identifying the underlying anatomic and physiologic causes of speech problems
3. Facilitating the diagnosis of speech disorder and contributing to the planning of the therapy
4. Providing accurate information and guidance.

## MATERIALS AND METHODS

This study aims at identifying the medical history, oral-peripheral characteristics and speech problems of children with CLP or craniofacial anomalies. To that end, a descriptive study was designed to assess and define the current state of patients.

### Participants

Participants of the study are the individuals who presented with cleft lip ± palate, submucous cleft, occult submucous cleft, or velopharyngeal insufficiency (VPI) to the Research Centre for Speech and Language Disorders Center (DİLKOM) of Anadolu University, and Faculty of Medicine of Kocaeli University in 2015 and 2016. Individuals with syndromes accompanied by cleft palate or VPI were also included in the study.

All participants were examined by plastic surgeons, otorhinolaryngologist, orthodontist, and evaluated by an audiologist. Parents of all participants gave their informed consent and signed the voluntary participation form.

Of the 56 participants included in the study, 21 are female and 35 are male and were aged 0–18 years at the time of the study. Twenty-one participants were ineligible and/or not suitable to perform the sentence repetition task, therefore excluded from the speech and resonance assessment which was eventually conducted with 35 participants. Distribution of participants by age and gender is given in Table 1. Distribution of participants by cleft type is given in Table 2.

Thirty-two of the participants received speech and language therapy: Eight participants continued the therapy for <6 months, six continued for 6–12 months, and 18 continued for more than 12 months.

### Forms and implementation

The CLP Assessment form designed in this study consists of three subforms, namely (i) the cleft lip palate family interview form, (ii) the cleft lip palate oral peripheral assessment form, (iii) the cleft lip palate speech and resonance assessment form.

### Cleft lip palate family interview form

This form serves to explore the possible genetic and

**Table 1: Gender and age range of participants**

Gender	Age range				Total, n (%)
	0-3, n (%)	4-7, n (%)	8-12, n (%)	13-18, n (%)	
Female	6 (10.7)	9 (16.1)	5 (8.9)	1 (1.8)	21 (37.5)
Male	9 (16.1)	13 (23.2)	9 (16.1)	4 (7.1)	35 (62.5)
Total	15 (26.8)	22 (39.3)	14 (25)	5 (8.9)	56

**Table 2: Cleft types of participants**

Cleft types	n (%)
Bilateral primary complete	1 (1.8)
Unilateral primary complete	1 (1.8)
Unilateral primary incomplete	1 (1.8)
Secondary complete	9 (16.1)
Secondary incomplete	17 (30.4)
Submucous cleft palate	3 (5.4)
Submucous + bilateral primary	1 (1.8)
Unilateral primary and secondary complete	16 (28.6)
Unilateral primary complete secondary incomplete	1 (1.8)
Bilateral primary secondary complete	4 (7.1)
VPI without any cleft	2 (3.6)

VPI: Velopharyngeal insufficiency

environmental factors underlying the CLP, and to obtain information about the child's prenatal, perinatal, postnatal history, as well as overall health status and development. The form also addresses the various problems which can arise independently and in multiple systems due to the syndrome [Annexure 1]. The form includes questions that address previous surgeries, the possible causes of CLP development, the symptoms associated with the differential diagnosis of syndromic and nonsyndromic CLP, developmental delays, feeding and swallowing problems, airway problems, and hearing problems.

The above information includes only those obtained from the families. This content certainly does not suffice for evaluating or diagnosing the specific area. Areas such as swallowing or hearing, for instance, need thorough assessment. It should be noted that the information obtained from the families serve merely as preliminary information for further considerations.

### Cleft lip palate oral peripheral assessment form

The peripheral examination part of this form addresses anomalies that are often seen in craniofacial syndromes, such as those of the skull, finger/toe, ear, nose, lip, and eyes. This section intends to draw the attention of speech therapists to the issues that should be considered in their cases and are particularly associated with syndromic individuals [Annexure 2].

Although there is no direct correlation between CLP-related speech problems and the size of the anatomic defect, the size of the defect varies between syndromic and nonsyndromic cases. Secondary clefts are more common among syndromic

cases.<sup>[6,7]</sup> The presence of fistulae, VPI, or occlusion problems have direct and severe influence on speech performance. Therefore, occlusion and dental problems, anomalies of the tongue that can directly influence speech, localization and size of a possible fistula, and any anatomic defects of the velum, uvula, and oropharynx should be examined prior to speech assessment. The second part of the oral peripheral assessment form is specifically designed to help correlate these anatomic issues with speech disorders [Annexure 2].

### Cleft lip palate speech and resonance assessment form

The forms are designed to take into account only those areas that are required in the assessment of individuals with CLP. As there are some widely used, valid, reliable and standardized language and articulation tests in Turkey, the areas that are already covered by these are not included in our forms with the thought that they can be used in combination. Instead, we added fields for commenting on the results of language tests, single-word naming articulation tests, and nasometric assessment tools.<sup>[8-13]</sup>

Given its practicality and its capacity to demonstrate the individual's connected speech skills, sentence repetition test is included in this form [Annexure 3]. In the sentence repetition section of this form, one target sentence was included for each of the consonants in the Turkish alphabet (including the allophones of "k" and "g" and excluding "ğ") for the purposes of identifying the individual's articulation errors. One consonant was targeted in each sentence and sentences were constructed by placing the targeted consonant within the words. Nasal consonants ("m, n") are not included in the sentences testing oral consonants (all consonants except for "m" and "n" are classified as oral consonants) – so that the sentences can also be used in nasoendoscopic examination. In normal speech, the velopharyngeal sphincter is completely closed when oral consonants are articulated, and open when nasal sounds are articulated. When nasoendoscopy is performed using words that contain nasal sounds, this will give the impression that there is no velopharyngeal closure.

Another aspect that is considered in this form is to avoid placing "s, z, ş, j, ç, c" in sentences that are used for testing other sound groups. The purpose is to allow for the testing of phoneme-specific nasal emission (PSNE), a disorder that will be discussed later in this article. PSNE is not the result of a structural disorder, but of mislearning where some of the "s, z, ş, j, ç, c" sounds are produced nasally and can be corrected only by speech therapy. PSNE should be considered if the individual sounds hypernasal when articulating the sentences that contain only these phonemes and sounds normal in those sentences that do not contain them.

In practice, sentences are read out loud by the examiner and repeated by the examined person. Correct articulation of target sound is marked in the True column, and wrong articulation is marked in the False column on the form. This section also includes a field for the phonetic transcription of the sentences according to the International Phonetic Alphabet (IPA) (The

IPA is a system of phonetic symbols designed by linguists to uniquely and accurately represent each of the wide variety of sounds [phones or phonemes] that are used in spoken human language).

Resonance assessment, as part of this form, is measured with a simple and perceptual test using a straw (in this test, one end of the straw is placed in the nostril of the child with CLP, and the other end is placed near the ear of the examiner and the child is asked to repeat high-pressure phonemes. One of the below described resonance disorders should be considered if air passes through the straw when the individual with CLP articulates these sounds) [Figure 1].

These assessments should be measured with instruments (e.g., nasometer and nasoendoscopy) and verified before diagnosis. Below is a description of how resonance disorders are assessed:

- **Hypernasality:** Hypernasality can be suspected if airflow is identified in stimuli that contain oral + vowel combinations (papapa, tatata, kakaka, sasasa, şaşşa) in the straw test. To distinguish hypernasality from nasal emission and turbulence, the nose opens and closes during prolonged articulation of "i" (i.e., "iiii"). Any variances in the open-close process are observed. Speech is marked as hypernasal in case of variances. As a final check, articulation should be observed for any similarities between the phonemes "b" and "m" and also "d" and "n"
- **Nasal emission:** The straw test is used for testing nasal emission in the same way it is used for testing hypernasality. The presence of airflow in the articulation of oral + vowel combinations (papapa, tatata, kakaka, sasasa, şaşşa) is checked during the straw test. Vowel production is verified to discriminate from hypernasal speech. Nasal emission box is marked if vowels are not considerably affected
- **Nasal rustle/turbulence:** This box is marked if nasal leakage which resembles snoring is heard during the production of fricatives (s, z, ş, j). Then, a straw test can be performed as described above. The turbulence originates



**Figure 1:** Implementation of the straw test

from a very small opening in the velopharyngeal region. Surgical intervention may not be always necessary

- Hyponasality: This is tested with speech stimuli using words and nasal + vowel combinations (e.g., ma and na) that contain the phonemes “m, n.” The person is asked to vocalize a prolonged “m” sound (“mmm”) both with open and plugged nose. Any variances in the production process are observed. Hyponasality box is marked in the presence of minor variances. The accuracy of the markings is verified by checking whether the sounds of “m” and “n” are articulated in a way similar to the sounds “b” and “d”
- Mixed resonance: This is marked if resonance quality changes during sentence repetition. This is to say that resonance is sometimes perceived as hyponasal and sometimes hypernasal
- PSNE: In sentence repetition test, the PSNE box is marked if nasality is perceived in sentences which “s, z, ş, j, ç, c” are used frequently, but no nasality is perceived in sentences that do not contain these phonemes
- Cul-de-sac resonance: This type of resonance disorder occurs when airflow is trapped in the vocal tract because of conditions such as large tongue, large tonsils, or hypertrophy. The speech is perceived as muffled
- Nasal grimace: This box is marked if the child wrinkles his/her nose during sentence repetition.

### Data analysis

Data analysis was performed in Microsoft Excel and given the descriptive nature of the study; results are presented as frequency and percentage. Fit index (FI) was used to estimate interrater reliability in the speech and resonance characteristics assessment section. The video recordings of all participants were reviewed by the three researchers of the study and scored based on the presence or absence of any errors (eg. backing, lateralization, weak consonant) in the production of the phonemes. FI value was calculated at 98.1% according to the below FI formula:

$$FI = \left( \frac{[\text{Total number of Fits}]}{[\text{Total number of Assessments}]} \right) \times 100.^{[14]}$$

## RESULTS

The below given are the highlights of the results obtained in the study.

### Results from cleft lip palate family interview form

#### *Prenatal history*

According to the information provided by their primary caretakers, 19.6% of the children are offspring of consanguineous marriage. About 30.4% have one or more case/s of CLP in their family. Regarding the medical history of their mothers, 14.3% had advanced maternal age and 23.2% had either a miscarriage or an abortion in the past. When mothers were asked about the substances they were exposed to in the first trimester of their pregnancy, 12.5%

indicated to have smoked, and 10.7% indicated exposure to radiation. While 21.4% indicated to have used medication, 51.8% indicated severe stress during pregnancy [Figure 2].

#### *Postnatal history*

According to the information provided by their primary caretakers, 91.1% of the participants experienced feeding difficulties, and 32.1% was fed nasogastrically. 26.8% experienced respiratory difficulties. About 25% had cardiological problems, 5.4% had renal problems, 3.6% had endocrinological problems, and 7.1% had neurological problems. 17.9% suffered inguinal hernia, and hemangioma developed in 1.8% [Figure 3].

#### *State of health at the time of assessment*

At the time of assessment, 32.1% had chewing difficulties and 19.6% had swallowing difficulties. 32.1% had nasal regurgitation. 23.2% had hearing impairment at various levels [Figure 4].

Regarding otitis media – one of the causes of hearing impairment – 44.6% of the participants had a history of 1–3 occurrences, and 8.9% had more than 10 occurrences [Figure 5].

While 57.1% of the participants was followed up by a hospital clinic, 42.9% was not followed by any health institution. Majority of the participants had undergone a series of surgeries that are directly associated with CLP, including for cleft lip, cleft palate, nose, fistula, pharynx, alveolar bone grafting, maxillary advancement, and ventilation tube, or surgeries that are mostly associated with the syndromes involving the kidneys, heart, testicular, or hernia. Of the 56 participants, 12.5% had undergone one surgery, 19.6% two surgeries, 30.4% three, 5.4% four, 3.6% five, 1.8% six, and 7.1% seven surgeries in the past [Figure 6]. Ventilation tube was the most commonly used (28.6%) procedure after cleft lip or palate surgery.

### Results from the cleft lip palate oral peripheral assessment form

Regarding the cranial characteristics of the participants, 11% had a triangular face structure, and 7% had flat zygomatic bones. Examination of the fingers as part of the peripheral assessment showed that 5% of the participants had hyperextension and elongated digits. Septal deviation was the most encountered condition in peripheral assessment (18%). About 16% of the participants had low nasal bridge. Regarding the lips, participants with open mouth and asymmetrical lips were seen to be equal in number (11%). Findings related to the eyes showed narrow palpebral fissure in 13%, and hypertelorism in 7% [Figure 7].

The most distinct issues observed in oral examination were malocclusion, occlusion defects, dental problems, fistulae, and problems in the velar area [Figure 8]. Of the individuals with CLP included in the study, 29% had Type III malocclusion, 23% had crossbite, 9% had anterior crossbite, and 14% had posterior crossbite. Regarding dental problems, 59% of the

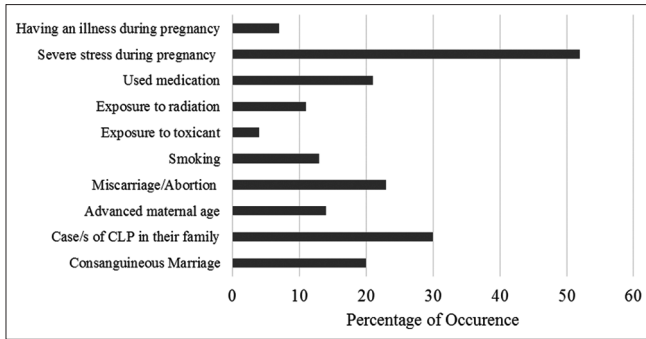


Figure 2: Prenatal history of participants

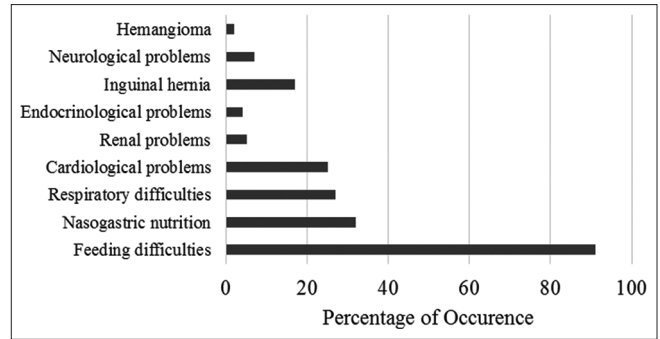


Figure 3: Postnatal history of participants

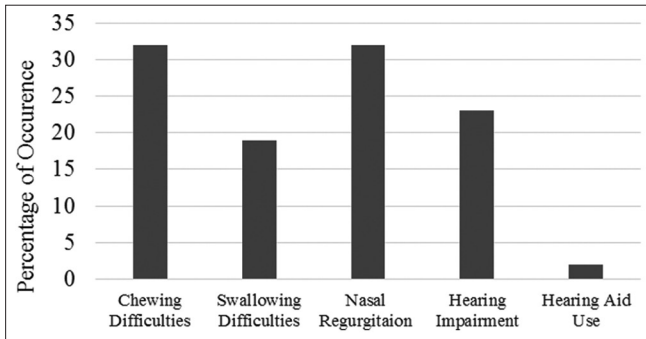


Figure 4: Current state of health during the assessments

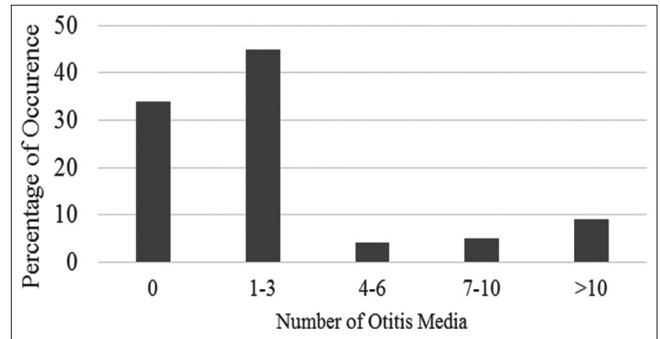


Figure 5: Occurrence of otitis media

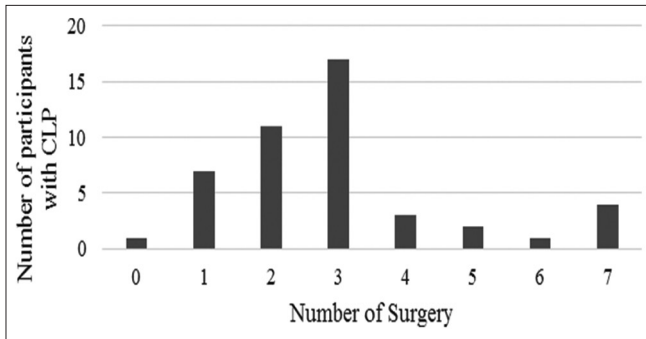


Figure 6: Number of surgeries that participants underwent

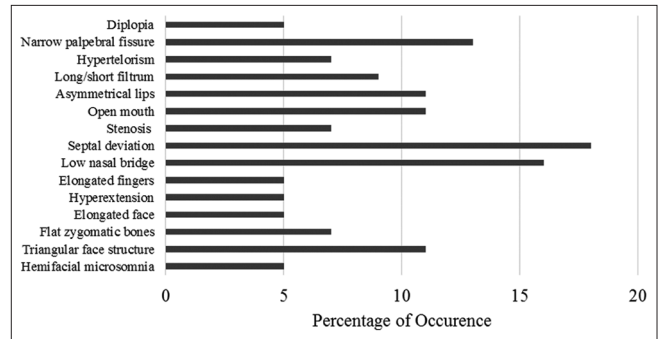


Figure 7: Percent of problems observed during peripheral examination

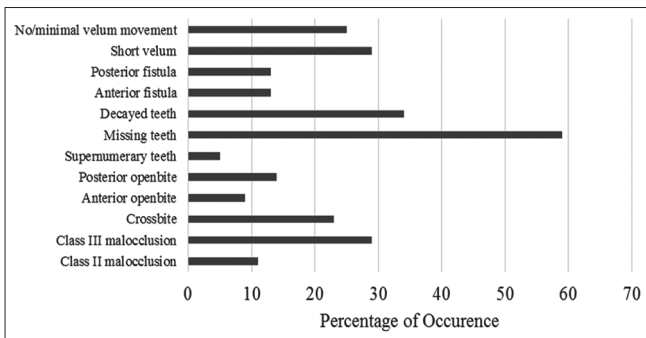


Figure 8: Percent of problems observed during oral examination

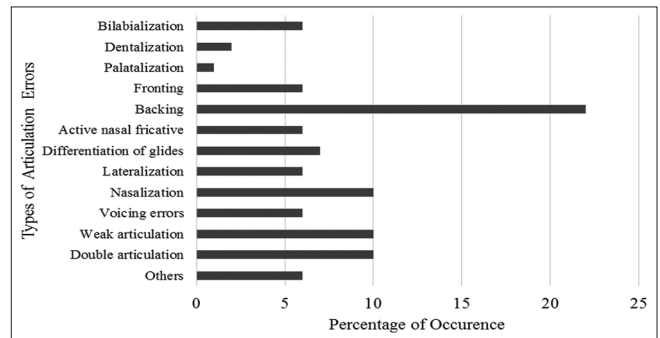
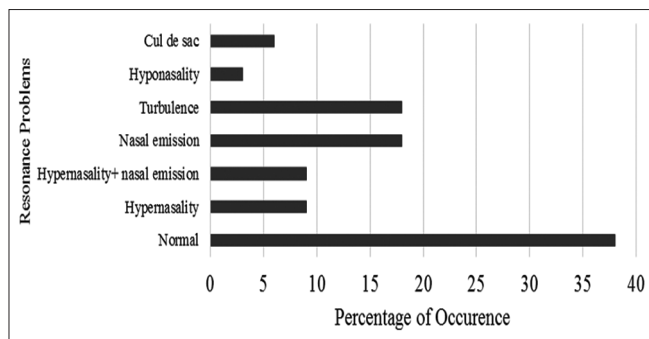


Figure 9: Percent of articulation errors that participants experienced

participants had missing teeth. Participants with anterior and posterior fistulae were equal in number (13%). As for velar area problems, 29% had short velum and 25% had minimal velum movement.

### Results from the cleft lip palate speech and resonance assessment form

The results of speech problems consist of the information from 35 participants. These are presented under two headings,



**Figure 10:** Percent of resonance problems that participants experienced

namely articulation and resonance.

### Articulation problems

As shown in Figure 9, the most common type of error made by the participants was backing (22%). Backing was followed by nasalization, weak production of sound, and double articulation errors (10%). Fronting and differentiation of glides, two of the most common types of error seen in normally developing children, were seen to be less common among the participants with CLP. Bilabialization, lateralization, changes in voice characteristics, and active nasal fricative sound production errors were each seen at a rate of 6%.

### Resonance problems

As shown in Figure 10, while 38% of the participants had no resonance problems, hypernasality was observed in 9%, and hypernasality plus nasal emission was observed in 9%. Emission and nasal turbulence was identified in 17% of the participants.

Speech and language disorders mostly develop from a specific cause. It is not possible to provide adequate information and administer effective therapies without a complete understanding of the causes of the disorder. In the presence of a complex anomaly such as cleft palate, which also brings about problems in numerous areas, the underlying causes that can lead to language, articulation or resonance disorders, and all associated structures should be evaluated to identify the correlation between these structures and the existing speech disorders. The forms developed as part of this study include the recommended aspects that speech and language therapists should consider in a thorough examination, also provide the content in a practical format that can be used in reporting and therapy planning. The information obtained through these forms in the assessment of individuals with CLP will highlight many critical data about the individual.

## DISCUSSION

According to the data obtained from the cleft lip palate family interview form, about 20% of the individuals with CLP are offspring of consanguineous marriage, and about 23% of the mothers had prior miscarriage. These findings are comparable with the results of the studies that report a prevalence of 22% for consanguineous marriages and miscarriages in normal

populations.<sup>[15,16]</sup> Our findings also show a high rate of CLP history in the families of the participants (30%). Given these data, families should be referred to the genetics department before further pregnancies.

The major difficulty families experienced after birth was feeding. In fact, 32% of the participants were fed through the nasogastric route (for more than 24 h in 44% of the cases). This shows that families should be informed in detail about feeding, and that bottles that facilitate feeding should be made more accessible to families.

Findings related to hearing are another significant aspect of the study. Hearing impairment at various degrees was reported in 23% of the participants. Most of these are mild and likely to have been caused by recurrent otitis media. That almost 35% of the families reported no past occurrences of otitis media in their children is another finding worth noting since some of these families come from rural areas and do not have the means for routine audiological examinations. This increases the likelihood that otitis media remained unnoticed in these children.

The section of the cleft lip palate oral peripheral assessment form which addresses craniofacial characteristics is deemed to provide important clues for discriminating those with the syndromes based on the information collected from those who have or are suspected to have syndromes.

The results of this study should be regarded not as defining prevalence, but rather as highlighting the major problems that develop with the condition. Some of these major problems – all of which trigger speech disorders – are missing teeth, carious deciduous teeth that families leave untreated thinking that they will fall off anyway, and Type III malocclusion which is not orthodontically treated and monitored (61.5%).

More than half of the participants were seen to have short velum or insufficient velum movement. This has direct impact on resonance and articulation skills. Supporting these findings with nasometric and nasoendoscopic data in further studies and examining them in terms of surgical approach and technique will enhance the effectiveness of surgical procedures.

The assessment of speech skills of participants showed backing to be the most prevalent issue, whereas backing is reported to be rare in normal populations.<sup>[11]</sup> This finding of our study matches those reported in the Hardin-Jones and Jones (2005) study.<sup>[17]</sup> Backing is a compensatory articulation error that children with CLP develop due to insufficient intraoral pressure secondary to a fistula or VPI. Phonemes that are normally produced in the alveolar area (e.g., “t, d, s, z”) are produced in the velar or its posterior area. The most common acts after backing are also associated with VPI, namely nasalization, weak production of sounds, and double articulation. Another articulation error caused by the presence of fistulae is lateralization. Here, the child covers the fistula with his/her tongue and allows the air to flow along the sides of the tongue instead of the midline.<sup>[18]</sup> This

act affects the articulation of “s, z, ş, j” and is difficult to correct in the presence of a fistula. Finally, Type III malocclusion is seen to cause some articulation errors. For instance, children with overjet where the incisors do not touch the lower lip were seen to bilabialize “f” and “v.”

Another finding worth noting in the study is that only 38% of the participants had no resonance disorders. Resonance disorders at different levels and forms were identified in the remaining 62%. Nasal emission and nasal turbulence were the most common disorders. This rate is considerably higher than the rates reported in the literature.<sup>[17,19-21]</sup> These results obtained through perceptual assessment using low technology should be compared to nasometric and nasoendoscopic data to demonstrate the similarities and differences between objective and subjective findings.

## CONCLUSION

This study presents the data from the first pilot of the form which is developed to be used in the assessment of individuals with CLP. Given the low number of participants, as well as the absence of instrumental measurements, the results should not be deemed to pertain to prevalence. However, the use of this form in other clinics can provide further detailed information on both the language and speech disorders and their underlying causes in children with CLP and allow for statistical analyses that provide a basis for instrumental measurements. Furthermore, we believe that this form will help close a significant gap by providing surgeons practicing in cities where there are no speech therapists with the means to conduct simple and practical speech assessment. Nevertheless, this pilot study needs to be used and assessed in higher numbers of participants to take its final form.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Acknowledgement

We would like to thank our participants for participating to our study; Tufan Bakır for designing the forms; Prof. Dr. Cengiz Çetin, Prof. Armağan İncesulu, Dr. İlhan Metin Dağsuyu, Dr. Nurdan Cankuvvet Aykut for taking parts in the cleft palate and craniofacial team work.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Shaw WC, Semb G, Nelson P, Brattström V, Mølsted K, Prah-Andersen B, *et al.* The Eurocleft project 1996-2000: Overview. *J Craniomaxillofac Surg* 2001;29:131-40.
2. Sell D, Harding A, Grunwell P. GOS.SP.ASS.'98: An assessment for speech disorders associated with cleft palate and/or velopharyngeal dysfunction (revised). *Int J Lang Commun Disord* 1999;34:17-33.
3. John A, Sell D, Sweeney T, Harding-Bell A, Williams A. The cleft audit protocol for speech-augmented: A validated and reliable measure for auditing cleft speech. *Cleft Palate Craniofac J* 2006;43:272-88.
4. Tylor AA, Tolbert LC. Speech-language assessment in the clinical setting. *Am J Speech Lang Pathol* 2002;11:215-20.
5. Bleile K. Evaluating articulation and phonological disorders when the clock is running. *Am J Speech Lang Pathol* 2002;11:243-9.
6. Dixon MJ, Marazita ML, Beaty TH, Murray JC. Cleft lip and palate: Understanding genetic and environmental influences. *Nat Rev Genet* 2011;12:167-78.
7. Saal HM. Classification and description of nonsyndromic clefts. In: Wyszynski DF, editor. *Cleft Lip and Palate: From Origin to Treatment*. Oxford: Oxford University Press; 2002.
8. Güven S, Topbaş S. Adaptation of the test of early language development-(TELD-3) into Turkish: Reliability and validity study. *Int J Early Child Spec Educ* 2014;6:151-76.
9. Topbaş S, Güven S. *Turkish Test of Language Development-Primary: Fourth Edition (TOLD-P:4)*. Ankara: Detay Yayıncılık; 2017.
10. Berument SK, Güven AG. Turkish Expressive and Receptive Language Test: I. Standardization, Reliability and Validity Study of the Receptive Vocabulary Sub-Scale. *Turk Psikiyatri Dergisi* 2013;24:192-201.
11. Topbaş SS. *Turkish Articulation and Phonology Test*. Ankara: Ministry of National Education Publishing; 2005.
12. Ege P, Acarlar F, Turan F. *Ankara Articulation Test-AAT*. Research Projects Publishing, Ankara University. Ankara: Key Design; 2004.
13. Ünal Ö. Nasometric evaluation of resonance disorders: A norm study with 4-18 years old Turkish speaking individuals. (Phd Dissertation). Eskisehir: Anadolu University; 2011.
14. Şencan H. *Reliability and Validity in Social and Behavioral Measurements/Scaling*. Ankara: Seçkin Publishing; 2005.
15. Koc I. Prevalence and sociodemographic correlates of consanguineous marriages in Turkey. *J Biosoc Sci* 2008;40:137-48.
16. Tomatir AG, Demirhan H, Sorkun HC, Köksal A, Ozerdem F, Cilengir N, *et al.* Major congenital anomalies: A five-year retrospective regional study in Turkey. *Genet Mol Res* 2009;8:19-27.
17. Hardin-Jones MA, Jones DL. Speech production of preschoolers with cleft palate. *Cleft Palate Craniofac J* 2005;42:7-13.
18. Kummer AW. *Cleft Palate Craniofacial Anomalies: Effects on Speech and Resonance*. 2<sup>nd</sup> ed. New York: Delmar; 2008.
19. Grunwell P, Sell DA. Speech and Cleft Palate/Velopharyngeal Anomalies. In: Watson AC, Sell DA, Grunwell P, editors. *Management of Cleft Lip and Palate*. London: Whurr; 2001.
20. Kummer AW. *Cleft Palate Craniofacial Anomalies: Effects on Speech and Resonance*. 3<sup>rd</sup> ed. New York: Delmar; 2014.
21. Prathane B, Pumnum T, Seepuham C, Jaiyong P. Five-year speech and language outcomes in children with cleft lip-palate. *J Craniomaxillofac Surg* 2016;44:1553-60.

## ANNEXURES

### Annexure 1: Cleft Lip Palate Family Interview Form

# Cleft Lip Palate Family Interview Form

Özlem Ünal Logacev & Eren Balo

Surgery	Age	Hospital / Center / Institute	Doctor	Reason if there is a delay
Lip 1				
Lip 2				
Palate 1				
Palate 2				
Palate 3				
Nose				
Fistula				
Pharyngoplasty				
Alveolar Bone Grafting				
Ventilation tube				
Maxillary (Distraction, ...)				
Other				
Therapy History				

Current Following Institution :

### Pre-Natal History

Consanguineous marriage : Yes  No

Degree of Affinity : .....

Delivery Method : Normal  Caesarean

Epidural

Family History of CLP/ CLP History of the Family : Yes  No

(close and distant relatives)

Age of Pregnancy : ..... Pregnancy Duration : ..... 38-40 hf

Birth Weight : ..... Miscarriage / Terminated Pregnancy : .....

01



# Cleft Lip Palate Family Interview Form

Özlem Ünal Logacev & Eren Balo

## Exposed Substances :

Cigarette / Smoking : Yes  No  Radiation : Yes  No  Alcohol : Yes  No   
Medication : Yes  No  Infection : Yes  No  Stress : Yes  No   
Toxic : Yes  No  Illness / Disease in Pregnancy (Diabetes etc) : .....  
Other : .....

## Peri-Natal History

Breech : Yes  No  Hypoxia : Yes  No  Cord Entanglement : Yes  No   
Long Delivery Duration : Yes  No  Meconium Aspiration : Yes  No  (Umbilical)

## Post-Natal History

Jaundice : Yes  No  Duration of Stay in the Incubator : ..... None   
Phototherapy : Yes  No  Duration of Nasogastric Feeding : ..... None   
Sepsis : Yes  No  Cardiovascular : Yes  No   
Convulsion : Yes  No  Nephritic : Yes  No   
Epilepsy : Yes  No  Endocrinologic : Yes  No   
Feeding Difficulty / Problem : Yes  No  Inguinal Hernia / Cryptorchidism : Yes  No   
Respiratory Distress : Yes  No  Neurologic : Yes  No   
Other Problems : .....

## General Health Status (Current)

Chronic illness / Diagnosis : Yes  No  If yes, what? : ..... Snuffle : Yes  No   
Sleep Apnea : Yes  No  Snore : Yes  No   
Other Health Issues : .....

## General Health Status (Current)

Chewing / Mastication Problem : Yes  No  Nasal Regurgitation : Yes  No  Swallowing Difficulty : Yes  No   
Foods can't be chewed : ..... Problem  
Beverages can't be drunk : .....

02

# Cleft Lip Palate Family Interview Form

Özlem Ünal Logacev & Eren Balo

## Developmental History

Age to Start Crawling : ..... Height and Weight Development : Normal  Behind the Peers   
Age to Start Walking : ..... Psychosocial Development : Extrovert  Introvert   
Age to Start Speaking : ..... Academic Development : Normal  Behind the Peers

## Language, Speech and Resonance

### Language :

Does not speak  One word level  2-3 words level  Does not use suffixes  Normal

### People who do not know him / her :

Always understand his / her speech  Sometimes understand his / her speech  Never understand his / her speech  
The person best : ..... understands his / her speech

### Resonance :

Nasal  Normal  Hoarse

### Hearing :

Number of Otitis :  None  1-3 Times  4-6 Times  7-10 Times  >10  
Hearing Problem :  Normal  Slight  Mild  Moderate  Moderately Severe  Severe  
Hearing Aid :  Yes  No  
Cochlear Implant :  Yes  No

03

## Annexure 2: Cleft Lip Palate Oral Peripheral Assessment Form

# Cleft Lip Palate Oral Peripheral Assessment Form

Özlem Ünal Logacev & Eren Balo

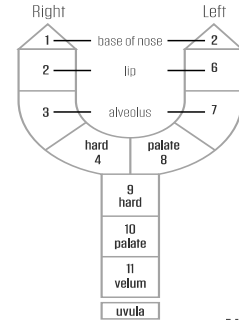
Cleft Type : .....

Other : (Submucous, Occult Submucous, Microform, Pierre Robin Sequence)

.....

.....

.....



### Peripheral Examination

Cranium	: <input type="checkbox"/> Hemifacial microsomia	<input type="checkbox"/> Triangular Face	<input type="checkbox"/> Flat Zygomas	<input type="checkbox"/> Long Face	<input type="checkbox"/> Microcephaly	<input type="checkbox"/>
Fingers	: <input type="checkbox"/> Hyperextension	<input type="checkbox"/> Extra	<input type="checkbox"/> Syndactyl	<input type="checkbox"/> Cubic	<input type="checkbox"/> Long / Thin	<input type="checkbox"/>
Ears	: <input type="checkbox"/> Aural Atresia	<input type="checkbox"/> Microtia	<input type="checkbox"/> Flap Eared	<input type="checkbox"/> Big Ear	<input type="checkbox"/> Low Ear	<input type="checkbox"/>
Nose	: <input type="checkbox"/> Low Nasal Bridge	<input type="checkbox"/> Septum Deviation	<input type="checkbox"/> Tubular Nose	<input type="checkbox"/> Stenosis	<input type="checkbox"/> Wide Alar Wing	<input type="checkbox"/>
Lips	: <input type="checkbox"/> Insufficient Movement	<input type="checkbox"/> Open Mouth	<input type="checkbox"/> Asymmetrical	<input type="checkbox"/> Lip Pits	<input type="checkbox"/> Long / Short Philtrum	<input type="checkbox"/>
Eyes	: <input type="checkbox"/> Hypertelorism	<input type="checkbox"/> Narrow Palpebral Fissure	<input type="checkbox"/> Epicanthic Fold	<input type="checkbox"/> Cross Eye	<input type="checkbox"/> Up / Downslanting	<input type="checkbox"/>

Explanation :

### Oral Examination

Occlusion	: <input type="checkbox"/> Class I	<input type="checkbox"/> Class II	<input type="checkbox"/> Class III	<input type="checkbox"/> Anterior Openbite	<input type="checkbox"/> Posterior Openbite	<input type="checkbox"/>
Dentition	: <input type="checkbox"/> Extra Teeth	<input type="checkbox"/> Missing Teeth	<input type="checkbox"/> Dental Brace / Apparatus	<input type="checkbox"/> Crossbite	<input type="checkbox"/> Decayed Tooth	<input type="checkbox"/>
Tongue	: <input type="checkbox"/> Lack of Movement	<input type="checkbox"/> Fasciculation	<input type="checkbox"/> Abnormal Posture	<input type="checkbox"/> Ankyloglossia	<input type="checkbox"/> Macroglossia	<input type="checkbox"/>
Fistula	: <input type="checkbox"/> ≤2 mm	<input type="checkbox"/> 3-5 mm	<input type="checkbox"/> 6-8 mm	<input type="checkbox"/> ≥9 mm		<input type="checkbox"/>
Fistula Location	: <input type="checkbox"/> Pre dental Cavity	<input type="checkbox"/> Incisive Foramen	<input type="checkbox"/> Hard Palate	<input type="checkbox"/> Velum	<input type="checkbox"/> Uvula	
Velum Movement	: <input type="checkbox"/> Posterior Pillar Web	<input type="checkbox"/> Asymmetrical	<input type="checkbox"/> Minimum	<input type="checkbox"/> None		<input type="checkbox"/>
Nasopharynx	: <input type="checkbox"/> Big Tonsils	<input type="checkbox"/> Deep Pharynx	<input type="checkbox"/> Absent pharyngeal wall movement	<input type="checkbox"/> Pharyngeal Flap	<input type="checkbox"/> Big Adenoid	<input type="checkbox"/>
Velum-Uvula	: <input type="checkbox"/> Bifid Uvula	<input type="checkbox"/> Short Velum	<input type="checkbox"/> Microform	<input type="checkbox"/> Blue / Thin Line	<input type="checkbox"/> Absent Uvula	<input type="checkbox"/>

Explanation :

04

### Annexure 3: Cleft Lip Palate Speech and Resonance Assessment Form

## Cleft Lip Palate Speech and Resonance Assessment Form

Özlem Ünal Logacev & Eren Balo

### Assessment of Articulation

Phoneme	Sentence	Phonetic Notation / Substitute Phoneme	True	False
/p/	İpek bu ip		<input type="checkbox"/>	<input type="checkbox"/>
/b/	Baba bana bak		<input type="checkbox"/>	<input type="checkbox"/>
/t/	Tolga topu tuttu		<input type="checkbox"/>	<input type="checkbox"/>
/d/	Dede bu davul değil		<input type="checkbox"/>	<input type="checkbox"/>
/k/	Kapkara kulaklı koyun		<input type="checkbox"/>	<input type="checkbox"/>
/g/	Karga gorili gagaladı		<input type="checkbox"/>	<input type="checkbox"/>
/ç/	İki kedi köpeği kovaladı		<input type="checkbox"/>	<input type="checkbox"/>
/ş/	Geyik gölgesini gördü		<input type="checkbox"/>	<input type="checkbox"/>
/f/	Fare filii fena dövdü		<input type="checkbox"/>	<input type="checkbox"/>
/v/	Volkan vazoya vurdu		<input type="checkbox"/>	<input type="checkbox"/>
/s/	Sapsarı saçlı Sezer		<input type="checkbox"/>	<input type="checkbox"/>
/z/	Zebra zeytin yemez		<input type="checkbox"/>	<input type="checkbox"/>
/ʃ/	Beş şişe şurup aldım		<input type="checkbox"/>	<input type="checkbox"/>
/tʃ/	Çocuk çiçek topladı		<input type="checkbox"/>	<input type="checkbox"/>
/dʒ/	Can camı kırdı		<input type="checkbox"/>	<input type="checkbox"/>
/ʒ/	Jale oje ve ruj sürdü		<input type="checkbox"/>	<input type="checkbox"/>
/l/	Ali lale al		<input type="checkbox"/>	<input type="checkbox"/>
/j/	Yüz ayva yedi		<input type="checkbox"/>	<input type="checkbox"/>
/r/	Ressam resim yapar		<input type="checkbox"/>	<input type="checkbox"/>
/m/	Maymun makarna yer mi?		<input type="checkbox"/>	<input type="checkbox"/>
/n/	Ninemle ben ninni söyledik		<input type="checkbox"/>	<input type="checkbox"/>

Explanation :

05

# Cleft Lip Palate Speech and Resonance Assessment Form

Özlem Ünal Logacev & Eren Balo

## Mark the Phonemes in His / Her Repertory

	Bilabial	Labiodental	Dental	Alveolar	Post Alveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	: p b			t d		t̠ d̠	c ɟ	k g	q ɢ		ʔ
Nasal	: m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	: ʙ			r		ɽ					
Tap / Flap	:	v		ɾ		ɽ					
Fricative	: ɸ β	f v	θ ð	s z ʃ ʒ			ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral Fricative	:			ɬ ɮ							
Approximant	:	ʋ		ɹ		ɻ	j	ɰ			
Lateral Approximant	:			l		ɭ	ʎ	ʟ			

\*In the table above the sounds/phonemes in green are the target sounds that the child is expected to articulate. The sounds/phonemes in red are not in Turkish language but can be produced in accordance with the child's problem.

## The Assessment of Resonance and Voice

### Non-Instrumental Assessment

Non-Nasal	Nasal
Kirpi	Mine
Çiçek	Nine
Sise	Memnun
Kelebek	Ninni
/i/	/m/

Resonance	Voice
<input type="checkbox"/> Hypernasality	<input type="checkbox"/> Cul de Sac Resonance
<input type="checkbox"/> Nasal Emission	<input type="checkbox"/> Nasal Grimace
<input type="checkbox"/> Nasal Rustle / Turbulence	<input type="checkbox"/> Mixed
<input type="checkbox"/> Phoneme Specific Nasal Emission	<input type="checkbox"/> Normal
<input type="checkbox"/> Hyponasality	<input type="checkbox"/> High
	<input type="checkbox"/> Hoarse
	<input type="checkbox"/> Dysphonia
	<input type="checkbox"/> Normal

\*For the velopharyngeal insufficiency (VPI), the child reads/repeats the non-nasal word list with the nose open and closed. VPI is suspected if there is a change in resonance. If there is not much of change in resonance, hyponasality is suspected.

## The Straw Test

	pa, pa	ta, ta	ka, ka	sa, sa	ʂa, ʂa
	pa...	ta...	ka...	sa...	ʂa...
Hypernasality / Nasal Emission / Nasal Turbulence	+	+	+	+	+
Anterior Fistula Escape	+	+	-	+	+
Phoneme Specific Nasal Emission	-	-	-	+	+

+: air escape / -: no air escape

+: If the child produces the sounds /s/ and /ʂ/ by closing the fistula with the tongue, the air may not come out.

The straw test: the straw is placed in the nostril of the person with CLP and the other side of the straw is placed in the ear of the therapist and the person is asked to repeat high-pressure sounds/syllables. When the person starts to produce these sounds, airflow is heard through the straw if there is an escape.

06

TB | TUFAN BAKIR