

Evaluation of nasolabial esthetics in 8- to 12-year-old patients with cleft lip and palate by healthcare professionals in Northeast Thailand

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Abstract

Objective: To assess the aesthetics of the nasolabial appearance of patients with cleft lip and palate aged 8–12 years by experienced and inexperienced professionals.

Methods: A cross-sectional study was conducted on 32 patients with cleft lip and palate, who underwent surgery and follow-up treatment at the Cleft Center. The research tools included a parent-completed survey providing GO graphic data and two-dimensional frontal view photographs of patients from both left and right sides. The aesthetic of the lip, nose, and nasolabial region was evaluated by an experienced and inexperienced medical professional team in groups of four individuals. In addition, data analysis was performed using descriptive statistics, mean values, standard deviations, Cronbach's alpha reliability coefficient, and the Wilcoxon signed-rank test.

Results: The average age of patients was 10.32 years, mainly male (65.63%), had unilateral cleft lip and palate (62.50%), and underwent bone grafting (96.88%). Regarding the assessment in three aspects, the aesthetic score assessed by experienced evaluators is fair level (2.64 ± 1.09) with an acceptable value of 0.73. In contrast, the inexperienced evaluator showed a high level (2.43 ± 0.83) with a high inter-rater reliability acceptable value of 0.60. Inexperienced evaluators showed higher scores for the lip and nasolabial region than experienced evaluators, which was statistically significant (p -values < 0.01).

Conclusions: The inexperienced evaluators showed significantly higher scores for appearance than experienced evaluators. This result can improve surgical techniques in future procedures to meet the needs of patients seeking lip and nasolabial appearance corrections across different age groups.

Keywords

Evaluation of nasolabial esthetics, healthcare professionals, cleft lip and palate, Northeast Thailand

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Introduction

The incidence rate of cleft lip and palate (CLP) in Thailand is 2.14 and in the Northeastern region at 2.28 per 1000 live births.¹ Various factors included genetic and environment.² Patients with CLP often have defects in the lip, nose, and palate, affecting functions such as feeding, communication, and nasolabial appearance (NA), ultimately impacting their quality of life (QoL) and their families.^{3,4}

Therefore, it is essential that an interdisciplinary team of experts be responsible for the treatment, surgery, and rehabilitation in accordance with the timing of the development

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from prenatal care to adulthood. Each age range necessitates distinct interventions:

- For children aged 0–5 years, treatment involves nutritional support, primary cheiloplasty and palatoplasty surgeries, and the promotion of communication development.
- Between the ages of 8 and 12, preparations are made for dental bone grafting surgery, orthodontic treatment, and potential correction of cleft lip and nose issues.
- From ages 16–20, orthodontic treatment is finalized, with consideration for corrective surgeries, if necessary, in some cases.

The evaluation of treatment outcomes across three distinct age ranges⁵ is essential for both the healthcare team and patients. These evaluations play a critical role in enhancing treatment quality, safety, patient satisfaction, and overall QoL. This study particularly focuses on the aesthetic assessment of patients from 8 to 12 years of age with unilateral and bilateral complete CLP, which had severely affected their NA. At this age range, the important part for children is that their traditional studies begin, so their social development has been improved starting with logical, concrete, and mathematical thinking.⁶

NA is crucial for aesthetic concerns, prompting cheiloplasty and/or rhinoplasty upon the surgeon, patient, and family approval.⁷ The nose, being the most visible facial feature, holds greater significance in NA than the mouth.⁸ According to the previous study, CLP patients aged 6–12 often exhibit dissatisfaction with their facial appearance, potentially exacerbated by increased surgical interventions and lower socioeconomic status leading to behavioral issues.⁹ Evaluation of NA in children with CLP aged 6–12 by both experienced and inexperienced medical personnel revealed high agreement in assessments and similar satisfaction levels with lip, nose, and overall nasal appearance. Although valuable, such studies are limited in scope. Nonetheless, assessments of NA in CLP children by both experienced and inexperienced evaluators underscore the relevance and validity of their ratings.¹⁰

This study aims to assess the aesthetics of NA patients with CLP aged 8–12 years by experienced and inexperienced professionals. The findings from this assessment will provide valuable insights into the medical team to enhance future treatment care.

Methods

Design

This cross-sectional research was conducted with patients with unilateral or bilateral complete CLP, who were 8–12 years old and who had received primary surgery from the Tawanchai Center at Srinagarind Hospital under the

Faculty of Medicine and the Faculty of Dentistry at Khon Kaen University. The sample group of participants, which ran from individuals 1–32, was selected using purposive sampling. The selected individuals must have been continuously engaged in follow-up treatments during the period in which the oral cavity was being prepared to receive dental bone grafting surgery and orthodontics. The criteria required for selecting the patients were having a unilateral or a bilateral complete CLP, continuing to follow-up their treatments, and having no comorbidities. The patients and their families are willing to participate and provide consent.

The exclusion criteria are patients with complete unilateral and bilateral CLP with comorbidities who are not willing to participate in the project.

The formula used to calculate the population (N) from 231 individuals was as follows:

$$n = \frac{NZ_{\alpha/2}^2 \sigma^2}{d^2 (N-1) + Z_{\alpha/2}^2 \sigma^2}$$

The overall value of the result from the treatment in terms of QoL and NA in patients with CLP, who were 10 years old,¹¹ was analyzed using a standard deviation of 1.39 ($\sigma^2 = 1.39$) $Z_{\alpha/2} = 1.96$, $d = 0.45$, $N = 231$, which was calculated from 32 patients at Tawanchai Center. The data were collected by taking the picture of the patients for 15 min. The duration of conducting the study is 9 months (January–September 2022).

Aesthetic assessment

The Evaluators: Eight evaluators, divided into two groups (experienced and inexperienced in cleft surgeries), assess the NA based on standard two-dimensional photographs. Evaluators include plastic and maxillofacial surgeons, orthodontists, and general practitioners. The assessment parameters include lip, nose, and nasolabial region aesthetics.

In this study, the experienced evaluator refers to professional surgeons specializing in plastic and maxillofacial surgeries who have more than 8 years of experience in performing cleft surgeries, as well as orthodontists who have treated cleft patients for more than 8 years. Conversely, the inexperienced evaluators are professional surgeons who have studied cleft conditions but have not performed surgeries. These two groups offer contrasting perspectives on aesthetic considerations, which proved beneficial for the assessment in this study.

Evaluation Parameters: It has been internationally accepted and standardized that, in the aesthetic assessment of the nose and lips, 2D pictures of the lips, the nose, and the nasolabial region are required (Figure 1). Each patient received three pictures taken with a blue background so that the detail of the face could stand out and be clearly visible.¹⁰ The nose and the lips were assessed separately, followed by an assessment of the NA of the nasolabial region. The

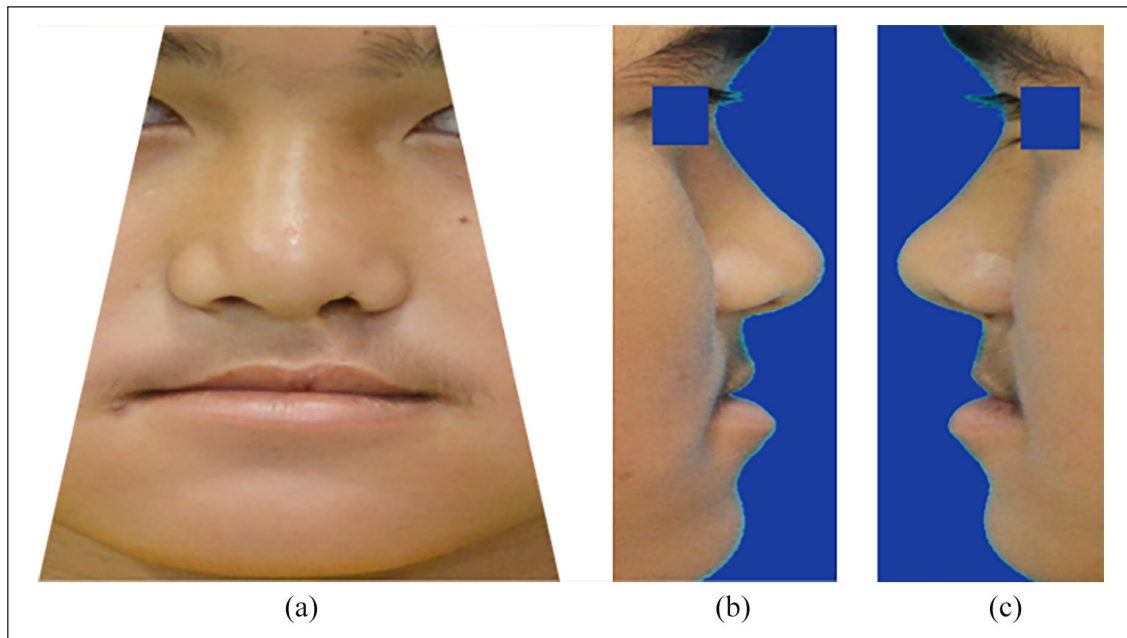


Figure 1. Representative standardized photos were taken of each patient. (a) Front view, (b) left lateral view, and (c) right lateral view.

criteria of the aesthetic assessment focused on the following: the symmetry and the fullness of the lips, the continuity of the upper lip; post-surgery scars; the symmetry of the tip of the nose; and the appearance of the columella area, the alar area, and base of the nose, with consideration of their relationship with the upper jaw.¹² During the assessment, each picture took 1 min with a 5-s break and continued until all 32 pictures had been assessed. The evaluators will be informed of the detailed assessment and perform a practice test before conducting the real evaluations. All participants, parents, and evaluators received both oral and written information about this study. Written informed consent was obtained from participants, their legally authorized representatives, and experienced and inexperienced evaluators.

The aesthetic assessment by the experts, which was referenced from Asher McDade et al.,¹² proposed the following 1–5 rating scale:

1. Points meant having a very good appearance.
2. Points meant having a good appearance.
3. Points meant having a fair appearance.
4. Points meant having a poor appearance.
5. Points meant having a very poor appearance.

For the average scores of appearances, there were three ranges as follows¹¹:

- 1.0–2.5, good level.
- 2.6–3.5, fair level.
- 3.6–5.0, poor level.

Data analysis

Statistical analysis involves calculating percentages and means, using Cronbach's alpha coefficient to assess inter-rater reliability, and employing the Wilcoxon signed-rank test to analyze satisfaction scores for lip, nose, and nasolabial region. A significance level of $p < 0.05$ is considered statistically significant.¹⁰

This study is approved by the Center for Ethics in Human Research, Khon Kaen University, Thailand (Approval Number: HE651565).

Results

- General patient information:
 - Gender: Most patients are males, accounting for 65.63%.
 - Diagnosis: Cleft palate with a unilateral defect is predominant, constituting 62.50%.
 - Treatment: Almost all patients have undergone bone graft surgery (96.88%).
 - Average age: The average age is 10.32 years.
- Caregiver information:
 - Caregivers: Mostly parents (65.63%) and grandparents (34.37%).
 - Treatment rights: Treatment is covered by the Universal Coverage Scheme or the Beautiful Smile Project, reaching 93.75%.
 - Education: A significant portion of guardians completed primary education (81.25%), while 9.37% completed vocational or undergraduate degrees.
 - Average monthly income: 10,969.56 Baht (Table 1).

Table 1. General information of patients with cleft lip and palate aged 8–12 years and their caregiver ($n = 32$).

| General information | Amount (%) |
|--|---------------------------|
| Gender | |
| Male | 21 (65.63) |
| Female | 11 (34.37) |
| Age (year, mean \pm SD) | 10.32 \pm 1.72 |
| Diagnosis | |
| Unilateral CLP | 20 (62.50) |
| Bilateral CLP | 12 (37.50) |
| Alveolar bone graft | |
| Had received ABG | 31 (96.88) |
| Had not received ABG | 1 (3.12) |
| Guardian | |
| Parents | 21 (65.63) |
| Grandparents | 11 (34.37) |
| Medical welfare/support | |
| Universal coverage scheme/the beautiful smile | 30 (93.75) |
| Beautiful voice project | |
| Government | 2 (6.25) |
| Education of parents | |
| Elementary/high school | 26 (81.25) |
| Vocational certificate/high vocational certificate | 3 (9.38) |
| Bachelor's degree or higher | 1 (3.12) |
| Uneducated | 2 (6.25) |
| Income of family (bath, mean \pm SD) | 10,969.56 \pm 12,483.56 |

The results of the evaluation of NA by the four experienced evaluators showed a “fair” level (2.64 ± 1.09). The aesthetic average score of the lips, the nose, and the sides of the face were 2.73, 2.56, and 2.63, respectively, which had all been at the “fair” level. The evaluators showed acceptable values at 0.69–0.76 ($p < 0.01$) (Table 2).

Nonetheless, the aesthetic assessment by the four inexperienced evaluators had shown average scores for overall facial appearance at 2.34 ± 0.83 indicating a good level. The average scores for the lips, the nose, and the sides of the face were 2.34, 2.40, and 2.27, respectively, all falling within the good level.

However, the interrater agreement reveals consistency among the inexperienced evaluators across all three aspects, with concordance correlation coefficients ranging from 0.38 to 0.73 ($p < 0.01$).

Upon analysis of the differences between evaluators with and without surgical experience in cleft palate treatment using Wilcoxon signed-rank, it was observed that the inexperienced evaluators provided significantly higher satisfaction scores for the assessment of the lip and the nasolabial region compared to experienced evaluators ($p < 0.01$). In addition, no significant differences were found in the evaluation of the nose between the two groups (Table 3).

Discussion

Patients with CLP face various physical and psychological challenges^{1,2} that can impact their confidence, social integration, learning, and daily life. Treatment for this group should not only focus on repairing the anatomical abnormalities but also consider aesthetic aspects to achieve the best outcomes for patients.^{10,13}

The aesthetic assessment can be done in many ways both quantitatively and qualitatively. Examples of quantitative ways include a symmetrical assessment of the nose and lips or the application of anthropometric measurements.^{14,15} The benefit of this type of measurement is that it provides data about the phases of the key positions on the face, which can be used in assessments, treatment planning, and surgery. Nonetheless, it is time-consuming and requires expertise. Most importantly, it is not an assessment that can be carried out by just looking, and in this way, it differs from public behaviors and the assessments that are done in daily life.

In 1991, the aesthetic assessment was used to evaluate the index of the aesthetic of the lip and the nose by Asher-McDade et al.¹² It has become widely used and found reliable when assessed by experienced medical professionals and the general public.^{13,16–19} This research study, which examined the aesthetic assessment by Asher-McDade in 32 unilateral and bilateral complete CLP patients, showed that the experienced evaluators had scored at the “fair” level with a high inter-rater in all three aspects and with statistical significance (Cronbach's alpha coefficient 0.69–0.76, $p < 0.01$).

However, the medical experts, who were inexperienced in CLP surgery, had given scores at a ‘good’ level (Cronbach's alpha coefficient 0.38–0.73, $p < 0.01$), and provided higher beauty scores than the experienced group. The reason could have been because the evaluator with experience in CLP surgery had examined the aesthetics in greater detail than the others. This factor corresponded to results from a study by Tobiasen et al.²⁰ and Meyer-Marcotty and Stellzig-Eisenhauer,²¹ in which the results differed from other research studies. In that study, it was found that the satisfaction scores by the experienced experts had been high¹² or even higher.^{19,22–24}

Finally, the aesthetic assessment of the patients with CLP aged 8–12 years undergoing treatment, involved many factors such as the experience of evaluators, especially those, who had exhibited a higher degree of expectation from the surgery. This factor resulted in giving lower scores than those who did not have experience in the field of CLP surgery. However, there were many more aspects involved with the aesthetic assessment, such as the points of view that the guardians and society held toward the facial appearance of the patients. Even the patients themselves had shown different perspectives or expectations regarding NA. Therefore, in the future, the appearance perspective should be studied, discussed, and concluded in many aspects.

Table 2. Cronbach alpha coefficient test, kappa, and the interpretation of results by evaluators with and without experience in treating patients with cleft lip and cleft palate in the beauty of the lips, nose, and the area between the nose and lip ($n=32$).

| Region | Number | Mean \pm SD | Cronbach's alpha coefficient | p-Value | Level |
|---------------------------|--------|-----------------|------------------------------|---------|-------|
| Lip (experience) | 1 | 2.68 \pm 0.73 | 0.69 | <0.01 | Fair |
| | 2 | 3.06 \pm 1.01 | | | |
| | 3 | 2.18 \pm 0.73 | | | |
| | 4 | 3 \pm 1.41 | | | |
| Average | | 2.73 \pm 1.58 | | | |
| Nose (experience) | 1 | 2.71 \pm 0.52 | 0.76 | <0.01 | Fair |
| | 2 | 2.93 \pm 0.87 | | | |
| | 3 | 2.18 \pm 0.93 | | | |
| | 4 | 2.43 \pm 1.01 | | | |
| Average | | 2.56 \pm 0.83 | | | |
| Nasolabial (experience) | 1 | 2.68 \pm 0.69 | 0.75 | <0.01 | Fair |
| | 2 | 3.31 \pm 1.17 | | | |
| | 3 | 2.84 \pm 0.72 | | | |
| | 4 | 1.71 \pm 0.81 | | | |
| Average | | 2.63 \pm 0.85 | | | |
| Average 3 domain | | 2.64 \pm 1.09 | 0.73 | <0.01 | Fair |
| Lip (inexperience) | 1 | 1.96 \pm 0.89 | 0.73 | <0.01 | Good |
| | 2 | 1.90 \pm 0.81 | | | |
| | 3 | 2.87 \pm 0.79 | | | |
| | 4 | 2.62 \pm 1.08 | | | |
| Average | | 2.34 \pm 0.89 | | | |
| Nose (experience) | 1 | 2.21 \pm 0.91 | 0.70 | <0.01 | Good |
| | 2 | 2.43 \pm 0.91 | | | |
| | 3 | 2.3 \pm 0.61 | | | |
| | 4 | 2.65 \pm 0.86 | | | |
| Average | | 2.40 \pm 0.82 | | | |
| Nasolabial (inexperience) | 1 | 1.96 \pm 0.82 | 0.38 | <0.01 | Good |
| | 2 | 2.03 \pm 0.82 | | | |
| | 3 | 2.87 \pm 0.65 | | | |
| | 4 | 2.21 \pm 0.75 | | | |
| Average | | 2.27 \pm 0.76 | | | |
| Average | | 2.43 \pm 0.83 | 0.60 | <0.01 | Good |

Table 3. Wilcoxon signed-rank post hoc test was used to measure the difference between evaluators with and without experience in treating patients with cleft lip and cleft palate in the beauty of the lips, nose, and the area between the nose and lips ($n=32$).

| Variable pairs | n | Mean \pm SD | Min | Max | Interquartile range | p-Value |
|----------------------------------|-----|-----------------|-----|-----|---------------------|---------|
| Lip (experience) | 128 | 2.73 \pm 1.06 | 1 | 5 | 2–3 | <0.01 |
| Lip (inexperience) | 128 | 2.34 \pm 0.96 | 1 | 4 | 2–3 | |
| Nose (experience) | 128 | 2.57 \pm 0.89 | 1 | 5 | 2–3 | 0.97 |
| Nose (inexperience) | 128 | 2.56 \pm 0.85 | 1 | 4 | 2–3 | |
| Nasolabial region (experience) | 128 | 2.64 \pm 1.04 | 1 | 5 | 2–3 | <0.01 |
| Nasolabial region (inexperience) | 128 | 2.27 \pm 0.83 | 1 | 4 | 2–3 | |

Strengths and limitations

This study demonstrates the concept of NA evaluations conducted by both experienced and inexperienced evaluators, with both groups exhibiting high inter-rater agreement and consistency in assessments, thus rendering the results reliable and reference-worthy. The selection of an adequate sample size, particularly comprising patients with severe

symptoms affected by their appearance, is crucial for representing the quality of information population and addressing the severity of the condition. Therefore, the evaluation of NA within this group necessitates to inform future surgical care and management practices for patients. However, the study did not directly reach the opinions of children due to cultural norms in Thailand where children may be hesitant to express their views on various matters.¹⁹ However, in future studies,

researchers plan to include children's perspectives on NA assessment to further inform treatment development.

Conclusion

Both experience and inexperience evaluators demonstrated high agreement in the NA assessment. The inexperience gave significantly higher appearance scores compared to the experienced group. This study suggests that it can lead to improved surgical techniques in future procedures to meet the needs of patients in their appearance. However, the aesthetic assessment involved diverse perspectives on the appearance of individuals regarding their experiences resulting in various conclusions about the aesthetics.

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Authors' contributions

All authors designed the study. Suteera Pradubwong and Yupin Paggasang collected the data. The research assistant took the photographs. All authors participated in interpreting the data and discussing the findings. The manuscript was drafted by Suteera Pradubwong. The manuscript was revised and approved by Kengkart Winaikosol.

Declaration of conflicting interests

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Ethical considerations

The study received approval from the Center for Ethics in Human Research, Khon Kaen University, Thailand (ref. HE651565).

Informed consent

Verbal and Written informed consent was obtained from legally authorized representatives and all participants before the study.

Trial registration

Not applicable.

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Supplemental material

Supplemental material for this article is available online.

References

1. Fuangtharnthip P, Chonnapasatid W, Thiradilok S, et al. Registry-based study of prevalence of cleft lip/palate in Thailand from 2012 to 2015. *Cleft Palate Craniofac J* 2021; 58(11): 1430–1437.
2. Chowchuen B, Surakunprapha P, Winaikosol K, et al. Birth prevalence and risk factors associated with CL/P in Thailand. *Cleft Palate Craniofac J* 2021; 58(5): 557–566.
3. Pradubwong S, Mongkhonthawornchai S, Keawkhamsean N, et al. Clinical outcomes of primary palatoplasty in pre-school-aged palate children in Srinagarind Hospital: quality of life. *J Med Assoc Thai* 2014; 97(Suppl 10): S25–S31.
4. Patjanasootorn N, Pradaubwong S, Rongbutsri S, et al. Tawanchai cleft center quality of life outcomes: one of studies of patients with cleft lip and palate in Thailand and the Asia Pacific Region. *J Med Assoc Thai* 2012; 95(Suppl 11): S141–S147.
5. Tawanchai Cleft Center. Guidelines for caring for cleft lip and palate patients by age range by interdisciplinary team, https://kkucleft.kku.ac.th/?page_id=1654 (2020, accessed 30 March 2022).
6. Kaewkangwan S. *Stages of development, age and age-specific characteristics*, Department of Psychology, Faculty of Arts Thammasat University, <https://www.healthcarethai.com/> (2023, accessed 30 December 2023).
7. Sinko K, Jagsch R, Prechtel V, et al. Evaluation of esthetic, functional, and quality-of-life outcome in adult cleft lip and palate patients. *Cleft Palate Craniofac J* 2005; 42(4): 355–361.
8. Mikalsen SK, Folstad I, Yoccoz NG, et al. The spectacular human nose: an amplifier of individual quality? *PeerJ* 2014; 2: e357.
9. Wehby G, Tyler MC, Lindgren S, et al. Oral clefts and behavioral health of young children. *Oral Dis* 2012; 18(1): 74–84.
10. Paiva TS, Andre M, Paiva WS, et al. Aesthetic evaluation of the nasolabial region in children with unilateral cleft lip and palate comparing expert versus nonexperience health professionals. *Biomed Res Int* 2014; 2014: 460106.
11. Surakunprapha P, Paggasang Y, Jenwitheesuk K, et al. Treatment outcomes of quality of life and nasolabial appearance in patients with cleft lip and palate of 10-year-old group. *Srinagarind Med J* 2021; 36(3): 340–346.
12. Asher-McDade C, Roberts C, Shaw WC, et al. Development of a method for rating nasolabial appearance in patients with clefts of the lip and palate. *Cleft Palate Craniofac J* 1991; 28(4): 385–390.
13. Bennett ME and Phillips CL. Assessment of health-related quality of life for patients with severe skeletal disharmony: a review of the issues. *Int J Adult Orthodon Orthognath Surg* 1999; 14(1): 65–75.
14. Farkas LG, Hajnis K and Posnick JC. Anthropometric and anthroposcopic findings of the nasal and facial region in cleft patients before and after primary lip and palate repair. *Cleft Palate Craniofac J* 1993; 30(1): 1–12.
15. Vegter F, Mulder JW and Hage JJ. Major residual deformities in cleft patients: a new anthropometric approach. *Cleft Palate Craniofac J* 1997; 34(2): 106–110.

16. Nollet PJ, Kuijpers-Jagtman AM, Chatziagianni A, et al. Nasolabial appearance in unilateral cleft lip, alveolus and palate: a comparison with Eurocleft. *J Craniomaxillofac Surg* 2007; 35(6–7): 278–286.
17. Fudalej P, Katsaros C, Bongaarts C, et al. Nasolabial esthetics in children with complete unilateral cleft lip and palate after 1-versus 3-stage treatment protocols. *J Oral and Maxillofac Surg* 2009; 67(8): 1661–1666.
18. Mani MR, Semb G and Andlin-Sobocki A. Nasolabial appearance in adults with repaired unilateral cleft lip and palate: relation between professional and lay rating and patients' satisfaction. *J Plast Surg Hand Surg* 2010; 44(4–5): 191–198.
19. Surakunprapha P, Pradubwong S, Jenwitheesuk K, et al. Evaluating the cost-effectiveness of plastic surgery based on the satisfaction with quality of life and nasolabial appearance in Thai preteens with cleft lip and palate. *Open Nurs J* 2022; 16(1): 1–11.
20. Tobiasen JM, Hiebert JM and Boraz RA. Development of scales of severity of facial cleft impairment. *Cleft Palate Craniofac J* 1991; 28(4): 419–424.
21. Meyer-Marcotty P and Stellzig-Eisenhauer A. Dentofacial self-perception and social perception of adults with unilateral cleft lip and palate. *J Orofac Orthop* 2009; 70(3): 224–236.
22. Papamanou DA, Gkantidis N, Topouzelis N, et al. Appreciation of cleft lip and palate treatment outcome by professionals and laypeople. *Eur J Orthod* 2012; 34(5): 553–560.
23. Gkantidis N, Papamanou DA, Christou P, et al. Aesthetic outcome of cleft lip and palate treatment: perceptions of patients, families, and health professionals compared to the general public. *J Craniomaxillofac Surg* 2013; 41(7): e105–e110.
24. Eichenberger M, Staudt CB, Pandis N, et al. Facial attractiveness of patients with unilateral cleft lip and palate and of controls assessed by laypersons and professionals. *Eur J Orthod* 2013; 36(3): 284–289.