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RESEARCH ARTICLE

Breastfeeding Promotion and Nursing Care for Infants with Cleft Palate and/or Cleft Lip in Northeastern Craniofacial Center, Thailand

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Abstract:

Background:

The common feeding problems in infants with Cleft Palate (CP) and/or Cleft Lip and Palate (CLP) are the inability to suck and swallow breastmilk. Difficulties in feeding may compromise normal growth and disrupt the bonding process.

Objective:

To evaluate the treatment and breastfeeding rate in infants with CP and CLP.

Methods:

A retrospective study of infants with CP and CLP who were admitted to the postpartum ward between July 2017 and June 2019 was conducted. Demographic data, type of feeding, nursing activities, and duration of breastfeeding after discharge were collected.

Results:

A total of 35 infants were included in the study. Twenty-seven cases were non-syndromic complete CLP (77.2%). On admission only 15 infants (42.8%) received breastmilk and alternative feeding techniques were applied for 26 (74.3%) infants. Breastfeeding promotion and nursing care were provided to mothers and infants by an interdisciplinary team at the Craniofacial Center. The median Length of Stay (LOS) was 8 days (range 5-9 days) and infants born at the affiliated hospital (inborn) had a significantly shorter LOS compared to infants referred from other health centers ($p=0.019$). None of the inborn groups received infant formula. The breastfeeding rate in all groups was 100% at discharge. Exclusive breastfeeding rates at 2-, 4-, and 6-months follow-up were 82.8%, 42.8%, and 31.4%, respectively.

Conclusion:

Breastfeeding promotion, education, and nursing care from an interdisciplinary team resulted in an improved ability of mothers to breastfeed infants with CLP, particularly in non-syndromic CLP. The exclusive breastfeeding rate after 6-months in this study was higher than in previous studies.

Keywords: Breastfeeding, Cleft lip, Cleft palate, Postpartum period, Human milk, Lactation.

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1. INTRODUCTION

Cleft Palate (CP) and Cleft Lip and Palate (CLP) are common birth defects [1], resulting from maldevelopment of lips, mouth, and nose during the 6th-9th weeks of pregnancy. The cleft palate is classified as being complete or incomplete based on the extent of the cleft. The complete cleft palate involves both primary and secondary palates as well as alveo-

lus. The prevalence of cleft deformities varies by ethnicity and country. Cleft lip with or without cleft palate is the fourth most common birth defect in Thailand, affecting 1.51 in 1,000 live births with 800 cases per year [2]. In the Northeast of Thailand, there is a higher prevalence of 1.93 per 1,000 live births [3]. The high prevalence is partly due to a background of consanguineous marriages, teenage pregnancy, and inadequate folic supplementation during pregnancy.

Cleft lip and palate are congenital deformities that contribute to physiological, sociocultural, and psychological

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problems of infants and their parents. In CP and CLP infants, feeding difficulties are one of the most immediate concerns following birth and are associated with growth impairment and malnutrition, particularly in the first year of life. The prevalence of malnutrition in CP and CLP infants varies from 32 to 68% depending on the type of cleft, presence of concomitant syndromes, region of origin, and socioeconomic status [4 - 7]. Furthermore, this condition is associated with complications such as ear infections, speech and language development delay, malalignment of teeth, and can be conjunct with other craniofacial syndromes [8].

The Tawanchai Center is a craniofacial center in Northeastern Thailand that provides care for CP and CLP babies born in Srinagarind Hospital (inborn) or referred from other health services in the Northeastern region (outborn), with an average of 20 cases per year. The Tawanchai Center provides comprehensive care to craniofacial cleft infants and their families via an interdisciplinary care team of health care professionals following a specialized protocol:

1. The families are supported and trained by nurses.
2. Craniofacial cleft infants are evaluated by pediatricians, plastic surgeons, and dentists to identify defects, concomitant syndromes, other congenital abnormalities, and to schedule necessary reconstructive surgeries.
3. Pediatricians and lactating nurses support and assist mothers to breastfeed and bond with their infants.
4. The team also provides psycho-emotional supports, health education, and teaches coping skills with social stigmatism for mothers and families
5. Finally, the quality of care is monitored and evaluated in five aspects consisting of health, education, social, livelihood, and empowerment.

A major concern of mothers of CP or CLP babies is the inability to breastfeed [9]. Successful breastfeeding for CP and CLP infants depends on the severity of the defect, with palate involvement making it more difficult for the baby to latch and suck efficiently. At our center, nurses in the postpartum ward coordinate with an interdisciplinary team to support breastfeeding, help mothers to initiate breastfeeding, and provide quality care.

Therefore, this study aimed to assess the initial feeding methods of CP or CLP infants and evaluate the care practices and breastfeeding promotion programs on mother-CLP infant dyads.

2. MATERIALS AND METHODS

2.1. Study Design

A retrospective descriptive study was conducted in the postpartum ward of Srinagarind Hospital, Khon Kaen University, Thailand. Srinagarind Hospital is a teaching hospital and one of the goals of the postpartum ward is to support mothers to breastfeeding.

2.2. Setting and Participants

Infants with complete cleft lip and palate or isolated complete cleft palate who were admitted between July 2017

and June 2019 and their mothers were included. Mother-CLP infant dyad referred from primary care hospitals in the Northeastern region also participated in the study. Critically ill infants admitted to the Neonatal Intensive Care Unit (NICU) or transferred to NICU within 48 hours after admission were excluded.

2.3. Data Collection

We collected data from medical records and lactation assessment notes as the major sources of information for data analysis.

The data recording form included patient's birthweight, date of birth, gender, type and severity of the cleft, the presence of concomitant syndromes or physical anomalies, type of feeding before admission, body weight on admission, treatment plan from the interdisciplinary care team, length of hospitalization, and duration of exclusive breastfeeding.

2.4. Data Analysis

The collected data were analyzed using STATA software version 10. Descriptive statistics are provided as frequency, percentages, medians, and interquartile ranges. The statistical differences between groups were considered significant at $p < 0.05$ using Fisher's exact test.

2.5. Ethical Considerations

This study was approved by the institutional review board of the Khon Kaen University, Human Ethics Committee, Khon Kaen University (HE621092).

2.6. Breastfeeding Promotion Intervention in the Postpartum Ward and Follow-up Protocol

In this study, the breastfeeding promotion interventions provided to mothers and infants, either inborn or outborn, included the following steps (Table 1).

1. General health examination by pediatricians to evaluate the type and severity of oral clefts, concomitant syndromes, or medical abnormalities.
2. Education and counseling regarding the importance and benefit of human milk, lactation, and breastfeeding to mothers and their families provided by pediatricians and nurses with special expertise in lactation. We also provided information regarding the benefits of breastfeeding and discussed breastfeeding intentions or concerns with mothers and families.
3. Promotion of early skin-to-skin contact and support for mothers to initiate breastfeeding as soon as possible. Mothers and infants stayed in the same room for 24 hours a day (rooming-in) when they arrived at the Srinagarind Hospital postpartum ward.
4. Evaluation of the infants sucking and swallowing abilities
5. One-to-one coaching on breastfeeding including correct positioning and attachment to make both mother and infant comfortable with the latch, how to hold the baby, support and breast squeezing to help the baby's sucking, and assistance to help the baby to latch on. Mothers were instructed on how to

express breastmilk by hand or pumping. Mothers were encouraged to breastfeed at least 7-8 times within the first 24 hours.

6. Management of common breastfeeding difficulties such as cracked nipples, breast engorgement, and low milk supply.

7. Monitoring of infant health conditions (e.g., weight gain, hydration) and screening for associated anomalies. Direct breastfeeding was the preferred feeding method. But if infants lost more than 10% of their birth weight while breastfeeding was being established, supplemental feeding using either cup feeding or lactation aid tube feeding with their mother's milk was encouraged to ensure adequate breastmilk intake. Pediatricians and lactation nurses continued to coach mothers until they felt confident to breastfeed their baby by themselves.

8. Assessment of maternal depression symptoms in mothers using a well-validated screening tools developed by the Department of Mental Health, Ministry of Public Health, Thailand.

9. Postpartum follow-up visits were scheduled at 2 weeks after discharge and then every 2 months until 6 months.

3. RESULTS

A total of 35 infants (10 inborn and 25 outborn) were included. Isolated cleft palate was present in 4 (11.4%) infants, cleft lip and palate in 27 (77.2%) infants, and 4 (11.4%) infants with syndromic cleft palate. Table 2 shows the characteristics of infants upon admission. Fifteen (42.8%) of the infants exclusively received breast milk, most of them were inborn, 12 (34.3%) infants were formula-fed, and 8 (22.9%) were fed a mixture of breastmilk and formula. All 35 mother-infant dyads participated in the interdisciplinary care program. Nursing activities included education about benefits and recommendation of breastfeeding, practicing breastfeeding skills, demonstrating proper breastfeeding positioning, breast milk expression, alternative feeding techniques (breast milk feeding technique through cup), supporting mothers to establish and maintain their milk supply, assessing the infant's sucking ability, body weight monitoring, and development and implementation of an infant care plan. For interdisciplinary care, 27 (77.2%) of the infants had pre-surgical orthodontic treatment (stapling and nasoalveolar molding) before surgery by the dentist. All infants were evaluated by pediatricians and plastic surgeons. The average score of parental satisfaction assessment after breastfeeding intervention was 9.5/10.

Table 1. Breastfeeding promotion intervention in Srinagarind Hospital postpartum ward.

Day of Admission	Domain of Care	Activities and Evaluation
Delivery room (within 2 hours after birth)	1. Early initiation of breastfeeding	- Skin-to-skin contact - Initiation of breastfeeding
Day 1 (Arrive postpartum ward)	1. Examination of the general condition 2. Breastfeeding promotion 3. Breastfeeding support and assistance by lactation nurses 4. Education and attitude 5. Psycho-emotional aspect	- General health examination by pediatricians - Physical examination: type and severity of the cleft, concomitant syndrome, medical illness - Rooming-in (mother, father, baby) - Skin-to-skin contact - Breast examination: short/flat/inverted nipples - Breastfeeding assistance: positioning - Infant: latch assessment - Benefits of breastfeeding - Psychological and depression assessment (questionnaire, individual assessment) and support
Day 2-3	1. Examination of the general condition 2. Family meeting with a multidisciplinary team 3. Breastfeeding support and assistance by lactation nurses 4. Psycho-emotional aspect	- Routine neonatal care and breastfeeding evaluation - Education and information about cleft-related health issues, benefits of breastfeeding, and protocol of patient's care. - Co-ordination with the multidisciplinary care team to set up a plan for the patient individually - Breastfeeding assistance: positioning, milk expression, milk handling and storage - Assessment of infant: weight gain, urine output, bowel movement, latch assessment - Psychological and depression assessment and support - Teaching coping skills with social stigmatism for mothers and families
From Day 4 until discharge	1. Examination of general condition 2. Breastfeeding support and assistance	- Routine neonatal care and breastfeeding evaluation - Breastfeeding assistance: positioning, milk expression, milk handling and storage - Assessment of infant: weight gain, urine output, bowel movement, latch assessment - Supplement with breast milk by alternative feeding methods if indicated
Follow-up visit	1. Examination of the general condition 2. Breastfeeding support 3. Meeting with a multidisciplinary team	- Weight gain, latch assessment - Breastfeeding assessment, milk expression - Co-ordinate with an interdisciplinary care team to evaluate and scheduled necessary intervention

Table 2. Characteristics of infants at admission.

General Information	Total (n=35)	Inborn (n=10)	Outborn (n=25)	p-value
Sex	-	-	-	0.99
Male	15 (42.8%)	4	10	-
Female	20 (57.2%)	6	15	-
Age on admission	-	-	-	0.07
Age 0 -7 days	27 (77.1%)	10	17	-
Age ≥ 7days	8 (22.9%)	0	8	-
Type of cleft	-	-	-	0.12
Isolated cleft palate	4 (11.4%)	3	1	-
Complete cleft lip and palate	27 (77.1%)	6	21	-
Syndromic cleft palate	4 (11.4%)	1	3	-
Body Weight	-	-	-	0.99
< 2,500 g	11 (31.4%)	3	8	-
2,501-3,000 g	12 (34.3%)	4	8	-
≥ 3,001-3,500 g	12 (34.3%)	3	9	-
Nutrition	-	-	-	<0.001
Breastmilk	15 (42.8%)	-	-	-
Breastfeeding*	9 (25.7%)	9	0	-
Breastmilk feeding†	6 (17.1%)	1	5	-
Mixed feeding (breastmilk and formula)	8 (22.9%)	-	-	-
Oral feeding‡	3 (8.6%)	0	3	-
Orogastric	5 (14.3%)	0	5	-
Infant formula	12 (34.3%)	-	-	-
Oral feeding‡	5 (14.3%)	0	5	-
Orogastric	7 (20.0%)	0	7	-
Length of hospital stay (median, days)	8 (IQR 5-9)	6 (IQR 5-8)	8 (IQR 5-10)	0.019

*Breastfeeding refers to the direct placement of the infant to the breast for feeding.

†Breast milk feeding refers to the delivery of breast milk to the infant through a bottle, cup, spoon, orogastric tube, or any other means except the breast.

‡Oral feeding refers to the delivery of milk to the infant through a bottle, cup, or spoon.

The median length of hospital stay was 8 days (IQR 5-9 days). The inborn CP or CLP infants who were assessed by the interdisciplinary care team soon after birth showed a significantly shorter length of hospital stay; 6 days (IQR 5-8 days) vs. 8 days (IQR 5-10), $p=0.019$. At discharge, the breastfeeding rate in all mothers of CP or CLP infants was 100%, even for syndromic CLP infants. The continuous exclusive breastfeeding rates after discharge at 2-, 4-, and 6-months follow-up were 82.8%, 42.8%, and 31.4%, respectively.

4. DISCUSSION

Increasing evidence shows the benefits of breastfeeding over formula, such as providing protection against acute otitis media [10], acute respiratory tract infections, acute gastrointestinal tract infections, and also preventing allergic disease and non-communicable diseases in later life [11]. Moreover, breastfeeding strengthens oral muscles, which contributes to orofacial development as an infant grows [12]. Infants with CP and CLP are at increased risk of growth retardation, infection-related problems, developmental delay during infancy as well as school-related problems in childhood. Human milk and breastfeeding are extremely important to support growth, development, and reduce morbidity in later life. However, feeding difficulties are commonly observed

among infants with CP and CLP. A lack of knowledge and confidence in the benefits of breastfeeding as well as the infant's orofacial defects are stressful problems that families have to face. Mothers and families may experience shock, confusion, distress, and guilt that can be difficult to overcome. Emotional stress has negative effects on the parents' lives that can lead to rejection or overprotection of their children. Previous studies showed a higher prevalence of psychosocial problems in children with CLP and their parents. Mothers of CLP infants had more insecure attachments to their infants, were less responsive and less sensitive to their infant's signals and expressed an emotional distance from the infants [13]. Children and adolescents with CLP were more likely to have behavioral problems, have less satisfaction with their facial appearance, and experience more depression, anxiety, learning problems, and difficulties with interpersonal relationships than unaffected children and adolescents [14]. In 2016, data from our center reported that CP and CLP infants and their parents experienced many medical and psychosocial problems including insufficient feeding, risk of respiratory tract infection, psychological problems (e.g., anxiety, stress, distress), socioeconomic problems (e.g., stigmatization, isolation, loss of income), spiritual problems (e.g., low self-esteem, low quality of life), and a lack of knowledge of CLP and treatment [9]. Immediate postpartum counseling,

instigation of skin-to-skin contact, early initiation of breastfeeding, and psycho-emotional support from nurses and pediatricians all play an important role in building confidence and resilience in confronting difficulties in breastfeeding of CP and CLP infants in addition to integrated, holistically long-term care by the multidisciplinary team starting from birth to adolescence.

In the past, breastfeeding rates among infants with CP or CLP have been reported to be low. A recent study performed in Uganda showed a mean breastfeeding duration of 4.3 weeks in CLP infants and not one of the CP infants was breastfed. Data from focus group discussions and in-depth interviews revealed multiple reasons for breastfeeding failure in this group, including struggles with the breastfeeding process, difficulties in expressing breast milk, poor breast milk supply, babies choking on milk, milk spillages, and nasal regurgitation [15]. In addition, the prevalence of malnutrition in CP and CLP infants, reported by Tungotyo *et al.* in Uganda, was 68% with 57% having moderate-to-severe malnutrition. The factors that were associated with malnutrition in this study were caretakers lacking nutritional information post-delivery, low birth weight, and having less than 10 feeds in 24 hours [6]. Thus, breastfeeding education and assistance are critical for adequate infant nutrition.

Our study emphasizes the role of nurses who take responsibility as lactating specialists to assist mothers to initiate and maintain successful breastfeeding or breast milk feeding for as long as possible. Moreover, one-to-one breastfeeding support, breastmilk expression, and tailored education are keys to success in breastfeeding infants with CP or CLP. Support from health professionals in interdisciplinary teams has demonstrated positive effects such as increasing the rate of breastfeeding initiation as well as the duration and the exclusivity of breastfeeding [16, 17].

In the current study, the inborn and outborn CP and CLP infants had similar demographic characteristics except for the feeding methods. According to our hospital policy, breastfeeding should be initiated as soon as possible following birth for stable CP and CLP infants, often in the delivery room. For mothers of low-birth-weight or preterm infants whose sucking ability is limited, studies have shown that immediate skin-to-skin contact may increase milk volume [18], boost parental engagements [19], increase bonding and attachment, as well as improve breastfeeding [20]. Further research is needed to evaluate the benefits of skin-to-skin contact in CP and CLP infants. Direct breastfeeding of CP and CLP infants is often discouraged due to the anatomical abnormalities combined with frequent concomitant syndromes or other health problems, and this is regardless of the severity of the cleft and general health conditions. None of the outborn CP and CLP infants in this study were breastfed on admission. Most of the outborn infants received their nutrients from breast milk or infant formula administered via oral feeding or orogastric tube. Physicians and health care providers are concerned about aspiration during breastfeeding of CP and CLP infants and prefer alternative feeding techniques. Moreover, primary care settings may have a shortage of lactation specialists to support and empower lactating mothers. However, in 2010, a study

from our center of 20 infants with CP and CLP reported no complications or aspiration from breastfeeding with all infants able to breastfeed [21]. The outborn CP and CLP infants had a significantly longer average length of hospital stay compared to the inborn group. The explanation is that delayed breastfeeding initiation caused difficulty in establishing an effective latching technique and sucking pattern in infants, which made it difficult to make the transition from bottle or tube feeding to the breast.

As a referral center, we encountered a variety of challenges, limitations, and obstacles in providing health care for infants with clefts that have been referred from primary care settings. The major problems of primary care setting include 1) a lack of interdisciplinary collaboration, 2) inaccessibility of health care services, 3) a lack of trained personal to provide lactating and breastfeeding support, 4) routine separation of newborn babies from their mothers, and 5) physician concerns about aspiration and poor growth. Therefore, we encourage health care centers to follow the 2019 revised guidelines of the Academy of Breastfeeding Medicine for breastfeeding infants with cleft lip, cleft palate, or cleft lip and palate [22].

In primary care settings with limited cleft-related experience, stable CP and CLP infants should receive early skin-to-skin contact and experienced partial- or non-nutritive breastfeeding directly on the mother's breast before other oral feeding methods are introduced. Mothers should be encouraged to express milk regularly and be taught to respond to their infants' feeding cues.

The early initiation of breastfeeding is a key factor for increasing rates of exclusive breastfeeding. Breastfeeding promotion for mothers and relatives includes regularly scheduled breastfeeding evaluations after discharge at least 2-3 times up to 6 months and aims to educate mothers about the importance of breastfeeding and promote confidence in breastfeeding. The exclusive breastfeeding rate at 6-months after discharge in this study was 31.4%, which is much higher than the 10% rate reported in a previous study in our center [21], the 13% reported in a study in Denmark [23], and the 6.9% reported in Ohio [8]. Moreover, our study showed a higher rate of exclusive breastfeeding after 6-months than in normal infants from the National health survey in 2015-2016, which was only 23% [24].

In this study, infants with CP and CLP were cared for according to the protocol of the interdisciplinary team made up of members from the Faculty of Medicine and the Faculty of Dentistry, which is a collaboration of care that makes the chances of breastfeeding more successful. Most of the infants referred from other hospitals were admitted with an OG tube for feeding whereas most of the infants born at Srinagarind Hospital were breastfeeding and received treatment by the interdisciplinary team from birth. All mothers participated in activities and practiced skills to promote breastfeeding and the continuous exclusive breastfeeding rate after 6 months was 31.42%, which is higher than previous studies. A positive relationship between parents and their babies was observed and they stated that breastfeeding improved their perception and that they felt proud of themselves to be breastfeeding successfully.

CONCLUSION

Breast milk is an essential nutrient to support growth and strengthen the immune system, which is particularly important for infants with CP and CLP that have difficulty with breastfeeding. Infants with clefts and their families usually face a multitude of health and psycho-emotional problems. Therefore, an interdisciplinary team approach that extends from birth to adulthood is necessary. Holistic care should cover five aspects of health, education, social, livelihood, and empowerment. Nursing staff promoting and helping mothers to breastfeed is critical in the early stage of life. The early initiation of breastfeeding and skin-to-skin contact are major contributors to success, particularly in CP and CLP infants, followed by education to emphasize the importance of breastfeeding in mothers' and infants' health. The mother should initiate breastfeeding under supervision immediately. In health care settings with limited cleft-related experience, stable CP and CLP infants should receive early skin-to-skin contact and experienced partial- or non-nutritive breastfeeding directly on the mother's breast before the introduction of other oral feeding methods. Mothers should be encouraged to express milk regularly and be taught to respond to their infants' feeding cues. Mothers should learn how to breastfeed using different breastfeeding positions, breast compressions, and nursing supplements if indicated. The goal is to support the mothers to continue breastfeeding as long as possible.

LIST OF ABBREVIATIONS

CP	=	Cleft Palate
CLP	=	Cleft Lip and Palate
IQR	=	Interquartile Range

AUTHORS' CONTRIBUTIONS

N.S., N.P., and S.S. contributed to the conception and design of this study; N.S. and N.P. performed the statistical analysis and drafted the manuscript; S.S. critically reviewed the manuscript and supervised the whole study process. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Human Ethics Committee, Khon Kaen University (HE621092).

HUMAN AND ANIMAL RIGHTS

Not applicable.

CONSENT FOR PUBLICATION

Not applicable.

AVAILABILITY OF DATA AND MATERIALS

Not applicable.

FUNDING

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest and no financial relationship with the sponsoring organization.

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