

Factors Affecting the Breastfeeding of Late Preterm Infants after Discharge from a Neonatal Intensive Care Unit in South Korea*

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Introduction

Late preterm infants are babies born between 34⁺⁰~36⁺⁶ weeks of gestation [1]. Globally, late preterm births are rising and account for approximately 70-80% of all preterm births. Additionally, among all births in South Korea, premature babies account for 6.47%, of which 87.5% are estimated to be late premature babies [2].

An accurate assessment of the gestational period is essential since it affects pediatric healthcare professionals' provision of appropriate treatment and management. However, until recently, there was no definite way to distinguish between late preterm and full-term infants were unclear [3]. As both usually have similar birth weights and appear healthy and fully developed, they were considered similar. However, late preterm infants often suffer from various health problems and higher hospitalization rates due to, for example, immature gastrointestinal function, weak oral tension, nervous system immaturity, etc. Thereby, late preterm infants require intensive care and they also suffer a mortality rate three times higher than full-term infants [4]; Given their high-risk status, they should be prioritized.

Exclusive breastfeeding is lauded for its benefits [5]. These include physical and nutritional (energy supply, digestible fat, and protein), immunological (macrophages, secretory immunoglobulin A, lactoferrin), and emotional (promotion of attachment) benefits

[6,7]. It is not surprising then that the World Health Organization (WHO) recommends breastfeeding for at least the first 6 months of life, regardless of gestational age [7,8].

However, previous studies reported more difficulties in establishing breast milk among late premature infants than among full-term babies. In particular, late preterm infants' breastfeeding initiation rate is reportedly between 59 and 70%, lower than that of full-term and younger premature (e.g., extreme preterm) infants [9]. The onset and rate of breastfeeding in late preterm infants tends to decrease past the postpartum period; both were lower than those for full-term or younger premature babies [10]. Thus, in neonatal intensive care units (NICUs) there is a heightened emphasis on special attention, lactation support, and the necessity of breastfeeding for late preterm infants [9].

Late preterm infants struggle with initiating and maintaining breastfeeding due to infant-, maternal-, and environment-related factors. First, regarding the infant, late preterm infants are developmentally immature and have less stamina; therefore, they have difficulty latching, sucking, and swallowing and are easily fatigued during lactation, leading to feeding problems. As a result, this can result in delayed weight gain, dehydration, jaundice, and sepsis (caused by increased hospital readmissions) [11]. Second, in regards to maternal factors, inadequate breast milk supply due to maternal health conditions (obesity, hypertension, diabetes mellitus, ruptured amniotic membranes),

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the mother feeling unsupported, the presence of other children in the family, lower education level, work/employment responsibilities, can contribute to lower breastfeeding rates [7]. Finally, regarding environmental factors, lack of education and support from medical staff due to early discharge, medical personnel's lack of awareness about the immaturity of late preterm infants, and a lack of interest in ensuring or improving lactation management tend to contribute to lower breastfeeding rates [12]. In other words, although late preterm infants are born with a gestational period and birth weight close to those of a full-term infant, breastfeeding might be more challenging for them due to the factors listed above, which may exacerbate their health problems after discharge [13].

Many studies have shown that ineffective breastfeeding in late preterm infants is a major predictor of disease morbidity [13]. However, most of the relevant literature focused on breastfeeding among premature infants without defining them according to their gestational age: therefore, research on breast milk in late preterm infants is scarce. In addition, these studies mainly identified breastfeeding practice rates and related factors during the hospitalization period [14]; consequently, research on the maintenance of breastmilk supply after discharge is also limited. Based on this theoretical background, it is necessary to identify the contributing factors to achieve a high breastfeeding rate.

In particular, South Korean mothers may experience difficulties in breastfeeding their babies due to changes in family structure and function. Specifically, since they previously maintained breastfeeding through the instruction and support of close relatives, the recent changes in family structure and function leave them without such support or resources to initiate and continue breastfeeding. Therefore, there is a critical need to identify women who require more effective supportive strategies in South Korea as they may be at risk of breastfeeding challenges. Further, medical personnel need to provide active breastfeeding management to safeguard the successful maintenance of milk supply among late preterm infants.

We aimed to identify the current breastfeeding status of late preterm infants over the monthly age after birth and factors affecting their breastfeeding practice. The research question is as follows; "How is the breastfeeding status and what is the related factors to promote or hinder breastfeeding in late preterm infants after discharge?", "what factors predict maintaining breastfeeding in late preterm infants at six months after birth?" Our results constitute basic data for developing an effective breastfeeding

program for late premature infants and their mothers.

Method

Design

This was a cross-sectional study identifying the breastfeeding status over the age and factors that affect breastfeeding in late-premature infants who had been discharged from the NICU.

Participants

Participants were mothers of late premature infants discharged from the NICU of a university hospital in South Korea. Inclusion criteria for mothers were as follows: mothers who understood the purpose and implications of the study. Inclusion criteria for infants were infants (1) with a gestational age of 34^{+0} ~ 36^{+6} weeks, (2) discharged with feeding orally and (3) infants over 6months old (4) without significant chromosomal abnormalities or congenital anomalies.

The minimum number of participants required for the sample, considering predictor variables, an effect size of 0.15, an alpha of 0.05, and a power of 0.95 for regression analysis, was 160 using G Power 3.1.9.7 [15]. We contacted 272 mothers with late premature infants over the phone through the in-hospital admission and discharge list considering that their participation rate would be low due to their difficult situation related to caring for premature babies. Among them questionnaires were initially distributed to 181 mothers who consented to participate in the study by mail. We excluded three mothers because they did not return the consent forms or submitted incomplete responses. The remaining 178 participants made up the final study sample.

Procedure

The bioethics committee at our institution approved this study [IRB CNUH-2013-142]. We obtained approval for the recruitment announcement and data collection from C university hospital managers in South Korea. To recruit mothers of late premature infants, we called each mother via telephone requesting their permission to conduct the study. After obtaining their permission and interest to participate, we sent detailed information about the study's purpose and the details of the questionnaire survey to them via mail. Participants who voluntarily consented to

participate in this study also returned the consent form and questionnaire by mail. As part of the ethical considerations, participants were told that they could withdraw from the study any time. We also confirmed to the participants that collected information would be used for research purposes only. Subsequently, those who voluntarily signed the written consent form completed a self-report questionnaire, taking approximately 15 minutes to complete. A small gift was given to the subjects as a token of appreciation for their participation.

Measures

The questionnaire asked sociodemographic regarding infants and mothers; and breastfeeding as described below.

General characteristic

Maternal Characteristics: maternal age, level of education, job, number of childbirth, type of delivery etc.

Breastfeeding-related Characteristics: type of breastfeeding planned, prenatal breastfeeding education, postpartum breastfeeding education experience, previous breastfeeding experience.

Infants Characteristics: gestational age, birth weight, number of babies born, gender, birth order, hospitalization period.

Breastfeeding practice factor

In order to measure breastfeeding status, we modified and used Kim et al.'s [14] questionnaire. The revised questions were verified for content validity (S-CVI/Ave = .90) by two pediatric nursing professors and one pediatrics specialist. In addition, we conducted a preliminary survey among 5 mothers in NICU to assess the questions' readability and appropriateness. The questionnaire included current breastfeeding status after birth over the age, breastfeeding practice factors, obstacle factors. According to the Infant Nutrition Classification System presented by the WHO, Level I refers to 100% complete breastfeeding regardless of the presence/absence of solid foods, In contrast, Levels II, III, and IV refer to mixed feeding. Level II represents more breastfeeding than formula feeding, Level III, breastfeeding and formula feeding at the same frequency, Level IV, less breastfeeding than formula feeding, and Level V, 100% formula feeding. The World Health Organization (WHO)[8] recommends exclusive breastfeeding for the first 6 months after childbirth.

However, in the case of South Korea, the practice rate of breastfeeding has gradually decreased and considering that it is lower than the world average of 42% [8] in South Korea, in this study, Level I, II, III, and IV were defined as practicing breastfeeding after birth. Since the monthly ages of the babies of the participants were different, we included a section for filling out the type of feeding(level I-V) in each unit of monthly age from birth to the present. The chronbach's alpha of this study was 0.95.

Data Analysis

The data were analyzed using the SPSS 23.0. First, we analyzed participants' general characteristics using descriptive statistics. Second, t-tests and analysis of variance were used to analyze differences in breastfeeding duration according to participants' general characteristics. We also analyzed breastfeeding practicing factors and hindering factors using frequency and percentage. Finally, we applied logistic regression to determine which factors influenced breastfeeding.

Results

General Characteristics

● Maternal Characteristics

The general characteristics of participants are shown in Table 1. Among the 178 mothers of late premature infants, the average age was 33.3±4.4 years. Those aged 30~34 years accounted for the most significant proportion (78; 43.8%). Mothers who were housewives accounted for 59% (105). Mothers with one child accounted for 46.6% (83) of participants. The most common type of delivery was a cesarean section, accounting for 57.3% (102) [Table 1].

● Breastfeeding related Characteristics

The proportion of mothers who planned to breastfeed was more significant (102; 57.3%) than others who planned to mix feed (both breast milk and formula feeding; 76; 42.7%). Most mothers had no prenatal breastfeeding education (132; 74.2%) [Table 1].

● Infants Characteristics

The average gestational period of late preterm infants was

35.5±0.64 weeks, with the most common being 34 weeks (146; 69.9%). The average birth weight was 2383.0±480.4 g. Single-birth babies were more common than multiples, accounting for 69.9% (146) of the babies born. Regarding the infants' gender, 51.7% (108) were male. Most infants were first children (127; 60.8%). Lastly, the average length of stay in the NICU was 8.8±5.8 days. [Table 2].

Breastfeeding duration according to Characteristics

We determined the duration of breastfeeding based on the type of breastfeeding for each month after infants' birth. The overall mean duration of breastfeeding was 4.7 months.

● Mothers and Infants' Characteristics

There was a statistically significant difference in breastfeeding duration according to the number of late preterm infants ($t=3.691$, $p<.001$), and baby birth order ($F=6.416$, $p=.002$) [Table 3].

● Breastfeeding related Characteristics

According to type of feeding planned, breastfeeding duration showed a statistically significant difference ($F=8.691$, $p<.001$). As a result of the Scheffé post-test, the breastfeeding duration was longer in planning exclusive breastfeeding than in the mixed feeding or formula feeding plans. In addition, the longer the planned breastfeeding period, the longer the breastfeeding duration ($F=24.779$, $p<.001$). Breastfeeding duration was significantly longer among mothers who had had prenatal breastfeeding education ($t=2.548$, $p=.012$). Breastfeeding while hospitalized

〈Table 1〉 General Characteristics of Mothers

(N=178)

Characteristic	Category	n (%)	Mean ±SD
Age(years)	≤29	28 15.7	33.3±4.4
	30-34	78 43.8	
	≥35	72 40.4	
Level of education	High school education	51 28.7	
	University education	127 71.3	
Job	Housewife	105 59.0	
	Office worker	49 27.5	
	Self-employed	12 6.7	
	Other	12 6.7	
Number or child birth	One	83 46.6	
	Two	63 35.4	
	Three or more	32 18.0	
Type of delivery	NSVD	76 42.7	
	Cesarean	102 57.3	
Type of feeding planned	Breastfeeding	102 57.3	
	Mixed feeding	61 34.3	
	Formula	15 8.4	
Planned breastfeeding period (month)	≤6	59 34.9	10.0±4.6
	7-12	91 53.8	
	>12	19 11.2	
Prenatal breastfeeding education experience	Yes	46 25.8	
	No	132 74.2	
Postpartum breastfeeding education experience	Yes	62 34.8	
	No	116 65.2	
Previous baby's breastfeeding type	Breastfeeding	26 33.3	
	Mixed feeding	36 46.2	
	Formula	15 20.5	
Previous breastfeeding duration (month)	<6	28 46.6	
	7-12	13 21.7	
	>12	19 31.7	

NSVD=normal spontaneous vaginal delivery.

* Previous breastfeeding experience was limited to participants who had childbirth before

($t=3.857, p<.001$) and long breastfeeding duration for a previous infant ($F=10.589, p<.001$) were associated with a longer breastfeeding duration for the current infant. Previous infants' feeding type showed a statistically significant difference to the current breastfeeding ($F=8.510, p<.001$). When they breastfed the previous baby, the current baby's breastfeeding period was more extended than the formula-fed baby [Table 3].

Breastfeeding practicing and obstacle factor

For those mothers that continued breastfeeding their infants, the following reasons were given as contributing factors: "For the growth and health of the baby" (155; 99.4%), which was the highest, "For the emotional bond between mother and baby" (145; 92.9%), "Because it is something that mothers must do" (136; 87.2 %), "Because mothers planned it" (133; 85.3%), and "Because it is convenient and economical" (100; 64.1%) [Table 4].

Among the barriers pointed out by mothers of late preterm infants as having contributed to breastfeeding failure were the following: "Due to poor milk flow" (75; 54.3%); "Difficult to express breast milk" (42; 30.4%) "I fear that the use of antibiotics might affect the baby" (14; 10.1%), "I got severe breast pain" (14; 10.1%) [Table 4].

● Analysis of Factors affecting breastfeeding maintenance at 6months after birth

In order to understand the factors that affect practicing breastfeeding at 6 months of age, we analyzed the general characteristics of mothers and babies based on whether or not they were breastfeeding from birth to 6 months of age. We used multiple logistic regression to examine the factors' effects on breastfeeding practice at the six months after birth time [Table 5]. The model was statistically significant, and 9.1% of the variance was explained. Mothers whose monthly income was 3-5 million won (OR: 0.209, 95% CI 0.049-0.896) were less likely to continue breastfeeding than mothers with incomes of over five million.

Discussion

Breastfeeding presents various health benefits for late preterm infants and should be strongly encouraged. Our study aimed to establish the basis for promoting breastfeeding by identifying the factors of breastfeeding practice concerning late preterm infants after discharge.

Regarding the characteristics of late preterm infants, there was a significant difference in breastfeeding duration according to the number of babies and birth order. For the number of babies born, single-birth babies breastfed for longer. This result supports those

<Table 2> General Characteristics of Late Premature Babies

(N=209)

Characteristic	Classification	n (%)	Mean ±SD
Gestational age (weeks)	34	146 69.9	35.5±0.64
	35	60 28.7	
	36	3 1.4	
Birth weight (g)	<1500	4 1.9	2383.0±480.4
	1500-1999	37 17.7	
	2000-2500	93 44.5	
	>2500	75 35.9	
Number of babies born	Single fetus	146 69.9	
	Multiple fetuses	63 30.1	
Gender	Male	108 51.7	
	Female	101 48.3	
Birth order	First	127 60.8	
	Second	58 27.8	
	Third and above	24 11.5	
Hospitalization period (days) [†]	≤7 days	120 58.0	8.8±5.8
	8-14 days	53 25.6	
	≥15 days	34 16.4	

[†] missing data

of previous studies (e.g., [16]), which reported that in the case of multiple fetuses, the rate of exclusive breastfeeding after discharge was significantly lower than that of single fetuses. In the case of multiple fetuses, we can judge that breastfeeding can be considered more burdensome for the mother in caring for two children. Thus, considering the high rate of multiple fetuses in this study and the recent increase in the number of multiple births derived from vitro procedures and artificial insemination, there should be increased interest in identifying the reasons for difficulty and low persistence in breastfeeding among this population so that they can be supported.

For mothers of multiples, breastfeeding has many advantages, such as reducing uterine contractions, helping to form mother-child attachment, saving the time required to prepare formula [17]. Therefore, they could benefit from further support and education,

such as being taught the various postures for breastfeeding two babies simultaneously by raising awareness about breastfeeding.

Furthermore, we identified that the lower the birth order of the baby, the longer the duration of breastfeeding, which aligns with Taveras et al.'s [18] finding that new mothers stop breastfeeding earlier. In addition, the longer the mother planned to breastfeed before birth, the longer the actual breastfeeding duration, which aligns with Lee, Chung, Ahn, Moon, and Park's [19] that when they planned to breastfeed, the practice rate of breastfeeding was high. Therefore, planning and motivation are essential in the concretization of breastfeeding. Thus, mothers, especially those with high-risk pregnancies (e.g., first-time mothers, multiple-birth mothers), who have difficulties breastfeeding, might benefit from breastfeeding promoting education before giving birth, motivating them to plan for active breastfeeding.

〈Table 3〉 Breastfeeding Duration according to the General Characteristics of the Mother and Infant

Characteristic	Category	Mean±SD	t or F	p	Scheffe
Age (n=178) (years)	≤29	5.2±4.0	0.215	.806	
	30-34	4.8±5.0			
	≥35	4.5±4.8			
Type of delivery (n=178)	Spontaneous delivery	4.8±4.8	-0.199	.842	
	Cesarean	4.7±4.7			
Gestational age (weeks) (n=209)	34	6.1±11.8	1.588	.207	
	35	3.9±4.7			
	36	4.4±4.1			
Number of babies born (n=209)	Single fetus	5.9±8.4	3.691	<.001	
	Multiple fetuses	1.9±2.1			
Baby Birth order [†] (n=209)	First ^a	3.7±3.8	6.416	.002	a<c
	Second ^b	5.1±5.1			
	Third or above ^c	9.3±17.8			
Type of feeding planned [†] (n=178)	Breastfeeding ^a	5.9±5.1	8.691	<.001	a>b,c
	Mixed feeding ^b	3.3±3.0			
	formula ^c	2.3±5.6			
Planned breastfeeding period [†] (n=178) (months)	<6 ^a	2.5±2.4	24.779	<.001	a<b<c
	7-12 ^b	5.5±4.6			
	>12 ^c	9.9±6.2			
Prenatal breastfeeding education experience (n=178)	Yes	6.2±5.9	2.548	.012	
	No	4.2±4.1			
Breastfeeding in the hospital (n=178)	Yes	5.8±4.7	3.857	<.001	
	No	3.1±4.2			
Previous baby's breastfeeding type [†] (n=77)	Breastfeeding ^a	8.7±5.2	8.510	<.001	a>b,c
	Mixed feeding ^b	4.7±4.6			
	Formula ^c	2.6±5.3			
Previous breastfeeding duration	<6 ^a	3.4±3.4	10.589	<.001	a<b,c
	7-12 ^b	8.9±7.0			
	>12 ^c	8.8±5.5			

[†] Scheffe test

Additionally, mothers' previous breastfeeding experience was a significant variable for the maintenance of breastfeeding which aligns with Kruse, Denk, Feldman-Winter, and Rotondo [20]. Since mothers' previous breastfeeding experiences may affect their decision and willpower to breastfeed their next child, support is vital for first-time mothers and those with a previously negative breastfeeding experience. Therefore, exposure to prenatal breastfeeding education is the most effective intervention to promote breastfeeding. Education to motivate first-time mothers could reduce the fear associated with breastfeeding and contributes to a longer breastfeeding period.

Based on this, our results also support the requirement to develop an application-based program that can monitor breastfeeding for late preterm infants with breastfeeding problems. Face-to-Face

education is challenging due to the ongoing coronavirus disease 2019 (COVID-19) pandemic and we believe that hospitals should provide prenatal breastfeeding education centered on actual behavior modeling using non-face-to-face media.

Breastfeeding duration was longer for late preterm infants who began breastfeeding while still in the hospital than for those who only breastfed their babies after discharge. This result aligns with Lee's [21] findings that the higher the amount of breast milk expressed by the mother during hospitalization, the higher the rate of breastfeeding after discharge due to stimulating the milk supply early on. This suggests that when breastfeeding was performed with the help of medical staff in the hospital, self-confidence and efficacy could be gained to mother, which could lead to long-term breastfeeding.

<Table 4> Breastfeeding practicing and obstacle factor

(N=178)

Breastfeeding practicing factor	n	%
1. "For the baby's growth and health"	155	99.4
2. "For the emotional bond between the mother and the baby"	145	92.9
3. "Because it is something that mothers must do"	136	87.2
4. "Because I planned to breastfeed her before she was born"	133	85.3
5. "Because it's a natural food"	112	71.8
6. "Because it's convenient and economical"	100	64.1
7. "To encourage my recovery from postpartum life"	98	62.8
8. "I feel guilty for the premature delivery"	73	46.8
9. "People around me recommend breastfeeding"	73	46.8
10. "I've breastfed before"	39	25.0
11. "The hospital told me to do it"	17	10.9
Obstacle Factor	n	%
1. "Shortage of milk"	75	54.3
2. "It's hard to express (produce) milk"	42	30.4
3. "The baby refused to be fed"	26	18.8
4. "I have inverted nipples"	22	15.9
5. "I'm afraid antibiotics will affect the baby"	14	10.1
6. "I suffer from mastitis"	14	10.1
7. "I didn't receive advice from the hospital regarding the importance of breastfeeding from the beginning"	10	7.2
8. "Afraid that mothers' diseases are transmitted to baby"	8	5.8
9. "Lacking nutrients since I gave birth prematurely"	7	5.1
10. "Previous experience with failing to breastfeed"	6	4.3
11. "My husband or other family members are against it"	5	3.6
12. "My baby fasted while I was in the hospital"	4	2.9
13. "No intention of breastfeeding"	3	2.2
14. "Difficult to transport breast milk"	3	2.2
15. "I thought powdered milk would be more nutritious than breast milk"	3	2.2
16. "I never tried breastfeeding from the beginning because of my career"	2	1.4
17. "I'm afraid my body shape will change if I breastfeed"	2	1.4

Regarding the factors that had the most impact on the breastfeeding practice, the mothers stated that they had chosen to breastfeed “For the growth and health of the baby” and “For emotional bonding between mother and baby.” This finding aligns with Baker et al’s [22] suggestion that the advantages of breastfeeding were that it strengthened immunity and emotional stability and was economically convenient. Therefore, when planning prenatal breastfeeding education, it is necessary to include the health benefits of breastfeeding in the content, including the effect on emotional bonding and physical development.

Furthermore, mothers also expressed their barriers to breastfeeding; these included: “Because the milk does not flow well,” “It is difficult to express breast milk” followed by “The baby refuses to breastfeed (latch on),” “I have inverted nipples,” (in this order).

In previous studies, insufficient milk volume was the most common reason for stopping breastfeeding within four weeks of childbirth. Maintaining an adequate milk supply was critical in breastfeeding success [23]. However, they recognized the lack of breast milk in early postpartum as a physiological obstacle to breastfeeding. It can explain by complex psychological processes. That is, mothers who have delivered premature infants are not only affected by physical problems, such as those resulting from cesarean delivery, diabetes, painful labor, obesity, and placental retention, but also by environmental factors, such as anxiety, stress, and hospital admissions. As this suggests the possibility

of poor milk secretion, we suggest more breastfeeding support for mothers with health problems [24]. In addition, since mothers of premature infants sometimes experience difficulties expressing breast milk after delivery, it is necessary to include information on maintaining and expressing milk in the educational content and recommend using a hospital-grade fully automatic breast pump. Furthermore, an experienced healthcare professional should carefully check the late preterm infant’s latch, sucking, and swallowing, with prudent judgment on whether supplementary feeding is necessary.

Most neonatal intensive care units currently limit parents’ visit; this is because it is difficult to operate a family room for monitoring, treatment, and infection control for intensive care of high-risk newborns due to COVID-19. Moreover, for directly breastfeeding premature infants in the neonatal intensive care unit, it would be most effective if the hospital established individual family-friendly wards to allow feeding at any time. In addition, offering a video-based program, application-based theoretical education, and non-face-to-face interactive exchange that can effectively implement direct breastfeeding in the neonatal intensive care unit would be helpful.

Finally, we found that mothers with high income were less likely to continue breastfeeding than those with lower income at six months after birth. This is consistent with previous studies [25] that reported that breastfeeding practice was lower among high-income than low-income earners. Thus, parental socioeconomic factors can be considered influencers of breastfeeding practice.

<Table 5> Factors Predicting Breastfeeding maintenance

(N=178)

		Coef	S.E	Odds Ratio	95% CI	p-value
Age	≤29	-0.318	0.487	0.727	0.280 1.888	0.513
	30-34	-0.465	0.506	0.628	0.233 1.692	0.358
Level of education	High school education	-0.107	0.406	0.898	0.405 1.993	0.792
Job	Housewife	0.389	0.404	1.475	0.669 3.254	0.336
	Office worker	-0.497	0.634	0.608	0.175 2.108	0.433
Monthly income	<3 million won	-0.355	0.377	0.701	0.335 1.468	0.346
	3-5 million won	-1.566	0.743	0.209	0.049 0.896	0.035
Gender	Male	-0.118	0.338	0.888	0.458 1.723	0.726
Birth order	First	0.670	0.383	1.954	0.923 4.139	0.080
	Second	0.582	0.545	1.790	0.615 5.208	0.285
Gestational age	34 weeks	-0.310	0.403	0.734	0.333 1.616	0.442
	35 weeks	-0.501	0.425	0.606	0.263 1.395	0.239

Reference group: Age(≥35), Level of education(University education), Job(Other), Monthly income(>5 million won), Gender(Female), Birth order(Third and above), Gestational age(36weeks)

This study is meaningful in that it identified the current breastfeeding maintenance and factors affecting practicing breastfeeding of mothers with late-preterm infants after discharge for improving the breastfeeding rate of infants and providing basic data for preparing detailed counter measures. However, this study is limited in that it did not investigate factors related to breastfeeding at the same time point. Future research should identify factors affecting breastfeeding by time after discharge.

Based on our study results, we suggest to carry out longitudinal studies to identify changes in the breastfeeding journey according to the characteristics of mothers and babies. In addition, the place where breastfeeding begins is the hospital, but the place where it continues after that is at home. Therefore, we suggest a continuous breastfeeding program through pre-discharge management and post-discharge management (if possible, link to home or visit nursing, or to postpartum management programs currently being conducted at public health centers, etc.). Further, in preparation for the COVID-19 situation, we propose an experimental study that focuses on developing and applying an educational program to promote breastfeeding among mothers of late preterm infants.

Conclusion

To promote breastfeeding in late preterm infants, medical institutions require support to establish a breastfeeding plan that includes providing prenatal breastfeeding education and support in the early postpartum period. Based on our results, the provision of interventions aimed at helping mothers of late preterm infants establish breastfeeding and maintain an adequate milk supply is of significant importance. In addition, hospitals should avail specialized nurses to assist and support mothers of late preterm infants in establishing breastfeeding before being discharged from the hospital. This is particularly important for first-time mothers and mothers of multiples.

Conflicts of Interest

The authors declared no conflict of interest.

References

1. Engle WA. A recommendation for the definition of “late preterm”(near-term) and the birth weight-gestational age

classification system. *Seminars in Perinatology*. 2006;30: 2-7. <https://doi.org/10.1053/j.semperi.2006.01.007>

2. Kosis. 2019 Number of Births by Gestational Week [Internet]. [cited 2022, March 4]. Available from: https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_2A_AF012&vw_cd=MT_RTITLE&list_id=R_SUB_OTITLE_OTIT_UNTIT_AA&seqNo=&lang_mode=ko&language=kor&obj_var_id=&itm_id=&conn_path=MT_RTITLE.
3. Shapiro-Mendoza CK, Lackritz, EM. Epidemiology of late and moderate preterm birth. *Seminars in Fetal & Neonatal Medicine*. 2012;17(3):163-169. <https://doi.org/10.1016/j.siny.2012.01.007>
4. Engle WA, Tomashek KM, Wallman C. Late-preterm infants: a population at risk. *Pediatrics*. 2007; 120(6): 1390-1401. <https://doi.org/10.1542/peds.2007-2952>
5. Ballesta-Castillejos A, Gómez-Salgado J, Rodríguez-Almagro J, Hernández-Martínez A. Development and validation of a predictive model of exclusive breastfeeding at hospital discharge: Retrospective cohort study. *International Journal of Nursing Studies*. 2021;117:1-8. <https://doi.org/10.1016/j.ijnurstu.2021.103898>
6. Britton JR, Britton HL, Gronwaldt, V. Breastfeeding, sensitivity, and attachment. *Pediatrics*. 2006; 118(5): e1436-1443. <https://doi.org/10.1542/peds.2005-2916>
7. Byerly T, Buckman C, Tumin D, Bear K. Prematurity and breastfeeding initiation: A sibling analysis. *Acta Paediatrica*. 2020; 109(12): 2586-2591. <https://doi.org/10.1111/apa.15290>
8. WHO. 2021 Breastfeeding [Internet]. [cited 2022, March 4]. Available from https://www.who.int/health-topics/breastfeeding#tab=tab_1
9. Colaizy TT, Morriss FH. Positive effect of NICU admission on breastfeeding of preterm US infants in 2000 to 2003. *Journal of Perinatology*. 2008;28(7):505-510.
10. Donath SM, Amir LH. Effect of gestation on initiation and duration of breastfeeding. *Archives of Disease in Childhood Fetal & Neonatal Edition*. 2008;93(6):F448-450. <https://doi.org/10.1136/adc.2007.133215>
11. Celik I.H., Demirel G., Canpolat F.E., & Dilmen U. A common problem for neonatal intensive care units: late preterm infants, a prospective study with term controls in a large perinatal center. *The Journal of Maternal-Fetal and Neonatal Medicine*. 2013;26(5):459-462.
12. Vila-Candel R, Soriano-Vidal FJ, Murillo-Llorente M, Pérez-Bermejo M, Castro- Sánchez E. Maintenance of exclusive breastfeeding after three months postpartum: an experience in a health department of a Valencian Community. *Aten. Primaria*. 2019;51(2):91-98. <https://doi.org/10.1016/j.aprim.2017.09.002>
13. Jang EH. Effects of Late Preterm Infants Care Education Program on Maternal Confidence, Breastfeeding Rate of the Mothers as well as on Growth and Readmission Rate of Late Preterm Infants. [dissertation]. Daegu: Dong A University; 2016. 1-3 p.
14. Kim MS, Ahn YM., Bae SM, Kim MJ. The Research on the Breast Feeding and its Related Factors of Premature Infant.

- Child Health Nursing Research. 2003;9(3):272-284.
15. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. Behavior Research Methods. 2009;41: 1149-1160. <https://doi.org/10.3758/BRM.41.4.1149>
 16. Wooldridge J, Hall WA. Post hospitalization Breastfeeding Patterns of Moderately Preterm Infants. Journal of Perinatal & Neonatal Nursing. 2003;17(1):50-65. <https://doi.org/10.1097/00005237-200301000-00005>
 17. Kim HS, Kang KA, Kim SJ, Bae WH, Chae SA., et al. Pediatric Primary Care. Seoul : Soo Moon Sa; 2012. p 281-283.
 18. Tomashek KM, Shapiro-Mendoza CK, Weiss J, Kotelchuck M, Barfield W, Evans S., et al. Early discharge among late preterm and term newborns and risk of neonatal morbidity. Seminars in Perinatology. 2003;30:61-68. <https://doi.org/10.1053/j.semperi.2006.02.003>
 19. Lee SO, Chung ES, Ahn SH, Moon, GN, Park NH. A study of predictors of breastfeeding. Child Health Nursing Research. 2003;9(4):368-375.
 20. Kruse L, Denk CE, Feldman-Winter L, Rotondo FM. Longitudinal patterns of breastfeeding initiation. Maternal & Child Health Journal. 2006;10(1):13-18. <https://doi.org/10.1007/s10995-005-0027-1>
 21. Lee CH. *Research on Breast feeding Pattern and Related Factors of Premature Infant's mother.* [master's thesis]. Seoul: Korea University; 2006. 33-34 p.
 22. Baker JL, Gamborg M, Heitmann B, Lissner L, Sørensen TI, Rasmussen KM. Breastfeeding reduces postpartum weight retention. The American Journal of Clinical Nutrition. 2008; 88(6):1543-1551. <https://doi.org/10.3945/ajcn.2008.26379>
 23. Ahluwalia IB, Morrow B, Hsia, J. Why do women stop breastfeeding? Findings from the pregnancy risk assessment and monitoring system. Pediatrics. 2005;116(6):1408-1412.
 24. Jang GJ. Comparing Factors Associated with Breastfeeding in Late Preterm Infants of Different Gestational Ages. Child Health Nursing Research. 2015;21(4):302-310. <http://dx.doi.org/10.4094/chnr.2015.21.4.302>
 25. Lee SJ. Trends and related factors of 6-month postpartum exclusive breastfeeding practice rate. [master's thesis]. Seoul: Chung-Ang University; 2020. 32 p.

Factors Affecting the Breastfeeding of Late Preterm Infants after Discharge from a Neonatal Intensive Care Unit in South Korea*

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Purpose: This study aims to determine the factors that affect the breastfeeding of late preterm infants (gestation age 34⁺⁰~36⁺⁶) in South Korea. **Method:** A cross-sectional and questionnaire-based survey was conducted on 178 mothers of 209 late preterm infants discharged from a university hospital. We collected data on participants' demographics, breastfeeding-related characteristics and current status of breastfeeding and analyzed them using SPSS. **Results:** Breastfeeding duration varied significantly according to the number of babies born ($t=3.691$, $p<.001$), birth order ($F=6.416$, $p=.002$), type of feeding planned ($F=8.691$, $p<.001$), planned breastfeeding period ($F=24.779$, $p<.001$), previous baby's breastfeeding type ($F=8.510$, $p<.001$), previous baby's breastfeeding duration ($F=10.589$, $p<.001$). The mothers with incomes of 3-5 million won a month were less likely to continue breastfeeding than those with incomes over 5 million won (CI: 0.049-0.086: $p=0.035$). **Conclusion:** Our results are meaningful in that we revealed that mother's monthly income influenced breastfeeding continuation, first-time mothers and mothers of multiples were at risk of breastfeeding difficulties. Interventions for helping late preterm infants' mothers establish breastfeeding and maintain an adequate milk supply are vital.

Key words : Breastfeeding; Infants; Mother; Neonatal; Premature

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