



Effects of a Self-Efficacy-Based Breastfeeding Support Program (SBP) on Primipara's Breastfeeding and Postnatal Depression

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Abstract

Background: We aimed to verify effects of a self-efficacy-based breastfeeding support program (SBP) through a 1:1 face-to-face education and non-face-to-face education via phone counselling on breastfeeding and postnatal depression in primiparous women.

Methods: This is a nonequivalent control group pre-posttest design study and primiparous women who gave birth at a tertiary general hospital in South Korea from May to Oct 2022 participated. Participants in the experimental group were provided with SBP (6 educational sessions) by the researcher for 4 wk after birth. Pre and post-test measures included breastfeeding knowledge, breastfeeding self-efficacy, adaption, breastfeeding rate, and postnatal depression.

Results: The participants were 48, with 26 in the SBP experimental group and 22 in the control group. Breastfeeding knowledge, breastfeeding self-efficacy, and adaption scores level of increase were significantly higher in the experimental group than in the control group ($P<.001$, $P=.010$, and $P=.012$). Breastfeeding rate was significantly higher in the experimental group than in the control group ($P=.011$). The score of postnatal depression was significantly lower in the experimental group than in the control group ($P=.032$).

Conclusion: The SBP was validated as a program that could promote the continuation of self-directed breastfeeding even after discharge by primiparous women experiencing breastfeeding for the first time and ultimately improve the health of both mother and infant, thereby providing evidence for effective breastfeeding intervention strategies for nursing in practice.

Keywords: Breast feeding; Self efficacy; Postpartum depression; Primiparity

Introduction

Breastfeeding could promote mother-infant interaction and attachment development as well as the health of both infant and mother (1). Benefits of and needs for breastfeeding have been highlighted by the United Nations Children's Fund (UNICEF) that recommend exclusive breastfeed-

ing for six months after birth, followed by up to two years of continued practice of breastfeeding combined with formula feeding (2). Nevertheless, the rate of exclusive breastfeeding for one month decreased from 55.6% in 2015 to 40.4% in 2018 in Korea (3).



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Due to the recent trend of nuclear families and low birth rates in Korea, there is a lack of role models for primiparous women, which reduces natural learning opportunities about breastfeeding (4,5). Primiparous women are less confident about breastfeeding and more anxious than multiparous women (6). As a result, many primiparous women are experiencing difficulties in the early stages of breastfeeding (4,5). Therefore, professional intervention is essential for primiparous women.

The act of breastfeeding between the mother and the infant is not a fixed state, but a process of change and adaptation through complex interactions across physical, psychological, and social factors of the mother (4,7). Factors that contribute to successful breastfeeding are adequate knowledge on breastfeeding, positive attitude toward breastfeeding, breastfeeding self-efficacy, and breastfeeding adaptation (8,9).

Self-efficacy is the belief that an individual can perform a certain action well, and is a factor that significantly influences the process in which a person performs an action and produces results. Accordingly, people with high self-efficacy can create an environment in which they can select and perform a specific action to produce positive results, and can continuously maintain that action (10). Breastfeeding self-efficacy is the most powerful influencing factor of continuous practice of breastfeeding by mothers (11,12). Thus, it is necessary to reinforce breastfeeding self-efficacy to ensure successful breastfeeding. In addition, it is possible for mothers to gain accurate knowledge and techniques related to breastfeeding through adequate education by an expert with subsequent preparation (13). This is why an education intervention is necessary to ensure that the practice of breastfeeding is continued with enhanced breastfeeding adaptation.

Numerous women after birth undergo mood disorders (14) and approximately 15% of these women experience postnatal depression within one year after birth (15). Breastfeeding could act as a protective factor against postnatal depression to regulate the cycle of sleep and wakefulness so that tiredness felt by the mother could be re-

duced (16). Thus, it is necessary to provide an intervention to increase the practice of breastfeeding by emphasizing values of breastfeeding with respect to mental health of postnatal women.

A face-to-face education on breastfeeding by an expert is the surest way to enhance the attitude and self-efficacy related to breastfeeding and increase breastfeeding rate (17). However, guidelines of infection control and social distancing during the COVID-19 pandemic have posed difficulties to conventional face-to-face education on breastfeeding for postnatal women (17).

As a way of non-face-to-face education, phone counselling is advantageous in that it is free from time and space constraints to allow individuals to use the service from an expert at will (18). As such, phone counselling can lead to a suitable strategy as a non-face-to-face resource in situations such as COVID-19 pandemic. In particular, as the current pandemic situation which limits the time of experts used for meeting infants and mothers who are more susceptible to infectious diseases, a face-to-face education should be given at the earliest chance to build trust in the mother and provide women with information and support, followed by non-face-to-face sessions for continuous education (19).

Recent previous studies have investigated the effects of breastfeeding intervention programs on breastfeeding rates and breastfeeding self-efficacy (17,19). However, studies investigating the effects of intervention programs on breastfeeding and postnatal depression in primiparous women were difficult to find.

Therefore, we aimed to investigate the effects of a self-efficacy-based breastfeeding support program (SBP) on breastfeeding knowledge and adaptation, and to increase primipara's breastfeeding self-efficacy to prevent postnatal depression and ultimately improve the breastfeeding rate.

Methods

Design

This study had a non-equivalent control-group

with a pre-posttest design to verify effects of a 4-week intervention by the SBP on breastfeeding rate and postnatal depression in primiparous women. To prevent errors caused by the spread of information regarding the experiment due to exchange between the two groups, data collection for the control group preceded that for the experimental group.

Participants

Participants of this study were primiparous women who gave birth at a tertiary general hospital located in U city in South Korea. Detailed inclusion criteria were: 1) a primiparous mother of a neonate at gestational age ≥ 35 wk and birth weight ≥ 2.5 kg; 2) a woman without any medical, physical, or psychological problem with breastfeeding and who intended to carry out breastfeeding.

The sample size for this study was estimated using the G*power program with an effect size $d = .80$ as reported in a previous study (20) that analyzed pretest-posttest variations regarding a breastfeeding support program using a one-sided test and applied the Cohen formula, with significance level $\alpha = .05$ and testing power $(1-\beta) = .80$. The required sample size was 21 participants in each group. Considering a dropout rate, the number of participants was 26 in the experimental group and 22 in the control group, and there was no dropout during the study period.

Measurement

1) Breastfeeding knowledge

Breastfeeding knowledge was measured using a tool developed by Lee (21), and modified subsequently by Kim (22). The tool consisted of 20 questions (benefits of breastfeeding for infants (5 questions), benefits of breastfeeding for mothers (4 questions), and how to overcome breastfeeding difficulties (11 questions)), and a higher score indicated a higher level of knowledge about breastfeeding. Cronbach's alpha was 0.86 in Kim (22) and 0.77 in this study.

2) Breastfeeding self-efficacy

Breastfeeding self-efficacy was measured using

the Korean version (23) of the short form of the Breastfeeding Self-Efficacy Scale (BSES-SF) developed by Dennis (24). The tool consisted of 14 questions, with each rated on a 5-point Likert scale. Higher scores indicated higher levels of breastfeeding self-efficacy. Cronbach's alpha was 0.92 in Kim (20), and 0.93 in this study.

3) Breastfeeding adaptation

Breastfeeding adaptation was measured using a short form of Breast-Feeding Adaptation Scale (BFAS-SF) developed by Kim (25). The BFAS-SF consisted of a total of 16 questions, including emotional interaction with the baby (4 questions), breastfeeding confidence (3 questions), sufficient milk supply (3 questions), baby's feeding ability (2 questions), and baby's satisfaction with breastfeeding (2 questions), and maintenance of milk supply (2 questions). A 5-point Likert scale was used, with a higher score indicating higher level of breastfeeding adaptation. Cronbach's alpha was 0.88 in Kim (25) and 0.90 in this study.

4) Breastfeeding rate

Breastfeeding rate was measured according to the infant nutrition guideline by the WHO (26). In the coding, Steps 1, 2, and 3 were interpreted as continuation of breastfeeding while Steps 4 and 5 were interpreted as discontinuation of breastfeeding.

5) Postnatal depression

Postnatal depression was measured using a tool developed by Cox et al (27) and translated by Han et al (28). This tool, Edinburgh Postnatal Depression Scale-Korean version (EPDS-K), consists of 10 questions (about mother's mood over the past 7 d), and each question is rated on a 4-point Likert scale. Higher scores indicated higher levels of depression. Cronbach's alpha was 0.85 in Han et al (28) and 0.84 in this study.

Intervention, SBP

1) Program development

The SBP developed and validated in this study was an intervention program based on the analysis of previous studies about factors influencing

breastfeeding rate and breastfeeding support programs (13, 22, 23, 29, 30). The final version of the program was completed through revision with systematic evaluation results and feedbacks by experts.

Based on Bandura's self-efficacy theory (10), four self-efficacy resources that could enhance self-efficacy belief (performance outcomes, vicarious experience, verbal persuasion, and emotional state) were used in the SBP for primiparous women. For performance outcomes, the intervention provided in this study included practice of early breastfeeding, breast self-massage, and direct breastfeeding, evaluation of breastfeeding state, and recording of a breastfeeding diary. For vicarious experience, a booklet containing breastfeeding success stories of other mothers and nurses at the neonatal unit was provided to primiparous women. For verbal persuasion, a personalised face-to-face education using the booklet and a non-face-to-face education via phone counselling after hospital discharge were provided. Also, trust was built with participants during face-to-face education so that they could express difficulties and feelings of anxiety and depression they experienced during non-face-to-face phone counselling education after hospital discharge, where they would be able to alleviate emotional instability through the experience of empathy.

2) Program application

Data collection for this study was conducted with the approval of the Institutional Review Board at the U hospital (IRB, 2022-05-006, CRIS, KCT0007713). The period of data collection in this study was from May to Oct 2022.

Participants in the experimental group were provided the SBP (total 6 educational session) over a period of four weeks after giving birth by the researcher. After the first breastfeeding, the pretest

investigation was performed. In the first intervention session, the participant and the expert directly assessed and analyzed feeding readiness of the mother and the infant, the rooting reflex, and patterns of fixing, adhering, and suckling using a tool that could measure the state of breastfeeding. Parts needing improvement in terms of posture and methods were revised so that the participant could attain performance outcomes and motivation from the first breastfeeding. In the second and third intervention sessions, personalised face-to-face education was provided during the period of admission of the mother and the infant. After participants were discharged, the fourth, fifth and sixth intervention sessions were performed via phone counselling to provide non-face-to-face education. Whether participants had a full grasp of contents of the previous education was checked and participants were interviewed (Table 1).

The control group, on the other hand, was provided with the conventional educational leaflet and education on breastfeeding offered at medical centers after the first breastfeeding.

At 4 wk after birth, all participation's posttest investigation was performed with an online survey platform.

Data analysis

Data were analyzed using IBM SPSS 28.0 program (IBM Corp., Armonk, NY, USA). Descriptive statistics including percentage, mean, and standard deviation were obtained for participants' characteristics. T-test, Mann-Whitney U test, and Wilcoxon signed-rank test were performed to analyze breastfeeding knowledge, breastfeeding self-efficacy, breastfeeding adaptation, and postnatal depression between experimental and control groups.

Table 1: Contents of Self-efficacy-based Breastfeeding Support Program (SBP)

Session		Self-efficacy resources	Program contents	Method
1	After the first breast-feeding	Verbal persuasion	<ul style="list-style-type: none"> • Assessment: explaining the overall health of the infant such as body measurements and assessment results • Education: the benefits of breastfeeding and the importance of early breastfeeding 	Personalised face-to-face education (10-15mins)
		Performance outcomes	<ul style="list-style-type: none"> • Performance: practice of early breastfeeding and attachment formation 	
		Emotional state	<ul style="list-style-type: none"> • Support: emotional support 	
2,3	1-3 d after giving birth	Verbal persuasion	<ul style="list-style-type: none"> • Assessment: breast and nipple, breastfeeding position and method • Education: the benefits of breastfeeding, breast self-massage, breastfeeding positions and methods, breast care methods, and expressing breast milk 	
		Performance outcomes	<ul style="list-style-type: none"> • Performance: breast self-massage, direct breastfeeding, evaluation of breastfeeding state, and recording of a breastfeeding diary 	
		Vicarious experience	<ul style="list-style-type: none"> • Sharing: a booklet containing breastfeeding success stories 	
		Emotional state	<ul style="list-style-type: none"> • Support: empathize with the difficulties of breastfeeding, emotional support 	
4,5,6	1, 2, 3 wk after giving birth	Verbal persuasion	<ul style="list-style-type: none"> • Assessment: breastfeeding position and method, breast care, and participants and babies' health assessment 	Non-face-to-face education via phone counselling (10-15mins)
		Performance outcomes	<ul style="list-style-type: none"> • Performance: breast self-massage, direct breastfeeding, evaluation of breastfeeding state, and recording of a breastfeeding diary 	
		Vicarious experience	<ul style="list-style-type: none"> • Sharing: breastfeeding practice rates and practice methods of other participants, and solutions to problems that may occur during breastfeeding 	
		Emotional state	<ul style="list-style-type: none"> • Support: empathized with the difficulties of breastfeeding, emotional support, encouragement to express concerns and anxieties related to breastfeeding, and explained that depression may be due to hormonal changes 	

Compliance with Ethical Standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the Institutional Review Board of the the Ulsan University Hospital (IRB No. 2022-05-

006). Informed consent was obtained from all participants.

Trial registration: The original trial was prospectively registered in the Korean Clinical Research information Service, CRIS under the reference number KCT0007713 on 15/08/2022. Further details can be accessed at: https://cris.nih.go.kr/cris/search/detailSearch.do?seq=22734&search_page=L

Results

The total number of participants was 48, with 26 in the SBP experimental group and 22 in the control group. The homogeneity test revealed no

significant difference in characteristics between experimental and control groups. Pretest levels of breastfeeding knowledge, breastfeeding self-efficacy, and breastfeeding adaptation were also homogeneous between two groups (Table 2).

Table 2: Homogeneity Test of Participants' Characteristics N=48)

Characteristics	Exp.(n=26)		Cont.(n=22)		χ^2 /t/Z	P
	Mean±SD or n(%)					
Age (years)	33.19±4.25		32.86±3.11		-0.30	.765
Education level ^a						
≤College	5	(19.2)	7	(31.8)	2.80	.412
University	15	(57.7)	13	(59.1)		
≥ Graduate school	6	(23.1)	2	(9.1)		
Occupation						
Yes	19	(73.1)	12	(54.5)	1.80	.232
Family income a month (10,000 KRW) ^a						
≤400	9	(34.6)	7	(31.8)	3.91	.462
401-500	2	(7.7)	5	(22.7)		
501-600	9	(34.6)	4	(18.2)		
≥ 601	6	(23.1)	6	(27.3)		
Maternal weight before childbirth (kg)	67.90±12.30		69.56±11.06		0.49	.625
Method of childbirth						
Vaginal birth	4	(15.4)	8	(36.4)	2.80	.180
Cesarean section	22	(84.6)	14	(63.6)		
Gestational age (weeks)	38.13±0.97		38.46±1.06		1.14	.260
Newborn weight (kg) ^b	3.09±0.51		3.09±0.46		-.04	.967
Newborn gender						
Male	13	(50.0)	10	(45.5)	0.10	.780
Female	13	(50.0)	12	(54.5)		
Time of breastfeeding decision ^a						
Before pregnancy	8	(30.8)	10	(45.5)	1.93	.448
During pregnancy	14	(53.8)	11	(50.0)		
After pregnancy	4	(15.4)	1	(4.5)		
Planned length of breastfeeding (month) ^a						
≤ 6	19	(73.1)	13	(59.1)	4.63	.113
7-11	3	(11.5)	8	(36.4)		
≥ 12	4	(15.4)	1	(4.5)		
Source of breastfeeding information ^a						
Health care provider	2	(7.7)	2	(9.1)	2.28	.645
Family or friends	15	(57.7)	16	(72.7)		
Media	8	(30.8)	3	(13.7)		
Others	1	(3.8)	1	(4.5)		
Antenatal breastfeeding education ^a						
Yes	1	(3.8)	1	(4.5)	0.02	>.999
Early breastfeeding (≤3 h) ^a						
Yes	23	(88.5)	17	(77.3)	1.07	.442
Use of postpartum care center ^a						
Yes	25	(96.2)	21	(95.5)	0.02	>.999
Help from others ^a						
Yes	25	(96.2)	21	(95.5)	0.02	>.999
Prelevel of						
Breastfeeding knowledge ^b	11.00±3.25		11.32±2.38		-0.26	.794
Breastfeeding self-efficacy	37.08±9.23		39.32±7.96		0.89	.377
Breastfeeding adaptation	3.34±0.44		3.42±0.44		0.59	.556

Exp.=Experimental group, Cont.=Control group, SD=Standard Deviation, KRW=Korean WON. ^aFisher's exact test, ^bMann-Whitney U test

In the posttest, the breastfeeding knowledge score increased from 11.00 to 18.19 in the experimental group ($P<.001$) and from 11.32 to 12.27 in the control group. The level of increase was higher in the experimental group than that in the control group ($P<0.001$). The breastfeeding self-efficacy score increased from 37.08 to 44.54 in the experimental group- ($P=0.007$) but decreased from 39.32 to 37.32 in the control group. There

was a significant difference in the increase between the pre- and post-test of the two groups ($P=0.010$). The breastfeeding adaptation score increased from 3.34 to 3.70 in the experimental group ($P=0.011$) but decreased from 3.42 to 3.32 in the control group. There was a significant difference in the increase between the pre- and post-test of the two groups ($P=0.012$) (Table 3).

Table 3: Comparisons of Breastfeeding Knowledge, Self-efficacy and Adaptation between Experimental and Control Groups ($N=48$)

Variables	Group	Pre-test	Post-test	t/Z	P	Differences	t	P
		Mean±SD				Mean±SD		
Breastfeeding knowledge ^a	Exp.	11.00±3.25	18.19± 2.97	-4.30	<.001	7.19± 3.85	-6.31	<.001
	Con.	11.32±2.38	12.27± 2.57	-1.48	.139	0.95± 2.80		
Breastfeeding self-efficacy	Exp.	37.08±9.23	44.54±11.33	-2.95	.007	7.46±12.92	-2.69	.010
	Con.	39.32±7.96	37.32±11.63	0.84	.410	-2.00±11.15		
Breastfeeding adaptation	Exp.	3.34±0.44	3.70± 0.67	-2.75	.011	0.37± 0.68	-2.62	.012
	Con.	3.42±0.44	3.32± 0.60	0.86	.399	-0.09± 0.51		

Exp.=Experimental group (n=26), Cont.=Control group (n=22), SD=Standard Deviation

^aWilcoxon signed-rank test

The breastfeeding rate was 65.4% in the experimental group, which was higher than that (27.3%) in the control group ($P=0.011$). Regarding the frequency of formula-feeding per day, the mean frequency in the control group was 6.86, which was higher than that (4.50) in the experi-

mental group ($P=0.002$) (Table 4).

The score of postnatal depression was 5.54 in the experimental group, which was lower level than that (8.23) in the control group ($P=0.032$) (Table 4).

Table 4: Comparisons of Breastfeeding Practice Rate and Postnatal Depression between Experimental and Control Groups ($N=48$)

Characteristics	Exp.(n=26)		Cont.(n=22)		χ^2 /t/Z	P
	Mean \pm SD or n (%)					
Breastfeeding practice						
Yes	17	(65.4)	6	(27.3)	6.97	.011
No	9	(34.6)	16	(72.7)		
Daily formula feeding count ^a	4.50 \pm 2.72		6.86 \pm 2.62		-3.05	.002
Maternal weight after 4 wk (kg)	59.81 \pm 10.34		61.31 \pm 10.44		0.50	.622
Baby's weight after 4 wk (kg)	3.99 \pm 0.70		3.97 \pm 0.52		-0.09	.928
Postnatal depression ^a	5.54 \pm 4.28		8.23 \pm 4.30		-2.14	.032
Classification of postnatal depression ^b						
Not depressed	20	(76.9)	15	(68.2)	0.67	.888
Minor depression	4	(15.4)	5	(22.7)		
Major depression	2	(7.7)	2	(9.1)		

Exp.=Experimental group, Cont.=Control group, SD=Standard deviation

^aMann-Whitney U test, ^bFisher's exact test

Discussion

In this study, the level of improvement in breastfeeding knowledge and breastfeeding self-efficacy at four weeks after birth was higher in the experimental group than in the control group. Additionally, the level of improvement in breastfeeding adaptation was higher in the experimental group than in the control group, suggesting positive effects of the program on breastfeeding adaptation. This agrees with previous studies reporting that the level of breastfeeding knowledge is higher in the experimental group provided with an intervention of breastfeeding education than in the control group (22). Additionally, these results align with previous studies, which have shown that self-efficacy scores are higher in the experimental group provided with a program to increase breastfeeding self-efficacy than in the control group (13,31).

In this study, the rate of breastfeeding at 4 wk after birth was 65.4% in the experimental group, which was higher than that (27.3%) in the control group. This agreed with studies (30,31) reporting that reporting that an intervention program for breastfeeding empowerment could increase breastfeeding self-efficacy and breastfeeding adaptation, thus increasing the rate of continuation of breastfeeding.

The lack of breastfeeding knowledge and skills to solve problems that arise in breastfeeding pose challenges to primipara mothers who experience breastfeeding for the first time (4). Factors that can prevent breastfeeding adaptation after birth include insufficient amount of breast milk, breast congestion, difficulty of latching-on, and sore nipple (32). Of these, insufficient amount of breast milk is the most critical cause of discontinuation of breastfeeding (33). In this study, the most frequent question during phone counselling in the experimental group was whether to continue direct breastfeeding rather than formula-feeding despite an insufficient amount of breast milk. To this question, the expert gave an explanation that the most effective way to increase and

maintain the amount of breast milk was direct breastfeeding with the latching-on for direct stimulation and facilitation of breast milk production. A personalised education with posture correction during face-to-face education promoted performance outcomes of participants experiencing breastfeeding for the first time. After discharge, non-face-to-face education via phone counselling allowed continuous education on breastfeeding. Since mothers could self-check whether they were correctly practicing breastfeeding, performance outcomes were reinforced. Such continuation of performance outcomes seemed to have positively affected the self-efficacy of participants. Additionally, the booklet of breastfeeding success stories of other mothers is presumed to have offered vicarious experience by observing others in similar situations successfully achieving breastfeeding, contributed to the enhancement of self-efficacy. Such positive reinforcement is presumed to have improved problem-solving and breastfeeding adaptation in primiparous women, thus increasing the score of breastfeeding adaptation. In light of this, the SBP developed in this study is likely to enhance breastfeeding self-efficacy in participating primiparous women.

Postnatal depression score in posttest investigation at the 4th week after birth was lower in the experimental group than that in the control group. This agreed with previous studies reporting that the level of postnatal depression was lower in mothers with exclusive breastfeeding than in mothers with breastfeeding combined with formula-feeding (34) and that postnatal depression symptoms could be reduced by increased satisfaction of the mother on breastfeeding (35). During phone counselling after discharge in this study, participants were encouraged to discuss not only the current state of breastfeeding and corrections on problems, but also their anxiety and concerns regarding breastfeeding. To mothers reporting problems in breastfeeding adaptation, the expert provided emotional support and encouragements to let mothers

know that they are doing sufficiently well. Such support from an expert via phone counselling is conjectured to have lowered anxiety and stress of participants. Moreover, with the breastfeeding support program enhancing breastfeeding adaptation, the score of postnatal depression seemed to have decreased. This suggests a need to recognize the importance of breastfeeding with respect to its effects on mental health of mothers and to reinforce interventions to assist with continuation of successful breastfeeding as part of the management of postnatal depression.

This study has several limitations. First, care should be taken when generalizing results of this study as the program was applied to primiparous women admitted at a single tertiary general hospital. Second, while the breastfeeding rate in this study was measured up to the 4th week after birth, a follow-up study should verify effects of the program in terms of breastfeeding rate based on results up to 6 months after birth and the recommended period of exclusive breastfeeding. Furthermore, considering that postnatal depression could occur within a year after birth (15), effects of long-term intervention should be verified. Finally, implementation of one-on-one programs to promote breastfeeding can involve significant costs due to the involvement of specialized professionals. However, the SBP can increase breastfeeding rates and thereby improve maternal and child health. Therefore, although the cost may initially seem prohibitive, it is important to recognize the significant value of such a plan from a nursing perspective.

Conclusion

The SBP developed and applied in this study was validated as a program that could promote the continuation of self-directed breastfeeding even after discharge for primiparous women experiencing breastfeeding for the first time and ultimately improve the health of the mother and the infant, thereby providing evidence supporting effective breastfeeding intervention strategies for nursing in practice. It allowed expert information

and education to be provided in an unexpected situation of a new infectious disease that could prevent face-to-face interventions. This implies the possibility of prenatal breastfeeding education for mothers and infants who are more susceptible to infectious diseases and continuation of management after birth. Thus, the intervention should be provided through liaison with not only medical centers, but also regional communities to a greater number of mothers with financial struggles who can use public health care centers or home visiting nurses.

Furthermore, to ensure that the novel program is actively used at medical centers, the current state of education time should be reflected in determining the medical cost while manpower specialised for breastfeeding education should be increased.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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References

1. Trudnak TE, Arboleda E, Kirby RS, et al (2013). Outcomes of Latina women in centering pregnancy group prenatal care compared with individual prenatal care. *J Midwifery Womens Health*, 58(4):396-403.

2. Maaike A, Vrinda M, Guy T, et al (2018). Breast-feeding: a mother's gift, for every child. The UNICEF, USA. www.unicef.org/media/48046/file/UNICEF_Breastfeeding_A_Mothers_Gift_for_Every_Child.pdf.
3. Lee SY, Kim EJ, Park JS, et al. (2018). The 2018 national survey on fertility and family health and welfare. Korea Institute for Health and Social Affairs, South Korea. <http://repository.kihasa.re.kr/handle/201002/32628?mode=full>
4. Kim SH (2010). Factors affecting mother's adaptation to breastfeeding. *J Korean Acad Nurs*, 40(2):225-35.
5. Yang HJ, Seo JM (2013). A structural model for primiparas' breastfeeding behavior. *J Korean Acad Nurs*, 43(3):399-408.
6. Lindblad V, Melgaard D, Jensen KL, et al (2022). Primiparous women differ from multiparous women after early discharge regarding breastfeeding, anxiety, and insecurity: A prospective cohort study. *Eur J Midwifery*, 6:12.
7. Kim SH (2009). Development of a Breast Feeding Adaptation Scale (BFAS). *J Korean Acad Nurs*, 39(2):259-69.
8. Brockway M, Benzies K, Hayden KA (2017). Interventions to improve breastfeeding self-efficacy and resultant breastfeeding rates: A systematic review and meta-analysis. *J Hum Lact*, 33(3):486-99.
9. Zhang Z, Zhu Y, Zhang L, et al (2018). What factors influence exclusive breastfeeding based on the theory of planned behaviour. *Midwifery*, 62:177-82.
10. Bandura A (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*, 84(2):191-215.
11. Ngo LTH, Chou HF, Gau ML, et al (2019). Breastfeeding self-efficacy and related factors in postpartum Vietnamese women. *Midwifery*, 70:84-91.
12. Haga SM, Ullberg P, Slinning K, et al (2012). A longitudinal study of postpartum depressive symptoms: multilevel growth curve analyses of emotion regulation strategies, breastfeeding self-efficacy, and social support. *Arch Womens Ment Health*, 15(3):175-84.
13. Yun SE, Lee HK (2012). Effects of breastfeeding adaptation, attitude and practice of primipara depending on method of postpartum breast-feeding education. *Korean J Women Health Nurs*, 18(2):75-84.
14. Farias-Antunez S, Santos IS, Matijasevich A, et al (2020). Maternal mood symptoms in pregnancy and postpartum depression: association with exclusive breastfeeding in a population-based birth cohort. *Soc Psychiatry Psychiatr Epidemiol*, 55(5):635-43.
15. Lewis NL (2020). Developing a hospital-based postpartum depression education intervention for perinatal nurses. *J Nurses Prof Dev*, 36(1):7-11.
16. Gay CL, Lee KA, Lee SY (2004). Sleep patterns and fatigue in new mothers and fathers. *Biol Res Nurs*, 5(4):311-18.
17. Lewkowitz AK, Lopez JD, Werner EF, et al (2021). Effect of a novel smartphone application on breastfeeding rates among low-income, first-time mothers intending to exclusively breastfeed: secondary analysis of a randomized controlled trial. *Breastfeed Med*, 16(1):59-67.
18. Caetano R, Silva AB, Guedes A, et al (2020). Challenges and opportunities for telehealth during the COVID-19 pandemic: ideas on spaces and initiatives in the Brazilian context. *Cad Saude Publica*, 36(5):e00088920.
19. Dodou HD, Bezerra RA, Chaves AFL, et al (2021). Telephone intervention to promote maternal breastfeeding self-efficacy: randomized clinical trial. *Rev Esc Enferm USP*, 55:e20200520.
20. Otsuka K, Dennis CL, Tatsuoka H, et al (2008). The relationship between breastfeeding self-efficacy and perceived insufficient milk among Japanese mothers. *J Obstet Gynecol Neonatal Nurs*, 37(5):546-55.
21. Lee EJ. The effect of prenatal breastfeeding education on breastfeeding practice and retention of knowledge [Master's Degree]. Daegu: Department of Nursing, Graduate School, Keimyung University; 1997
22. Kim SH. Effects of prenatal breastfeeding education intervention on breastfeeding knowledge and practice in primiparous women [Master thesis]. Graduate School of Nursing Sciences, Hallym University, Korea; 2020.
23. Kim SY. The effects of prenatal breast self-massage education on breastfeeding self-efficacy, adaptation, and practice in primiparous women [Master thesis]. Seoul. Graduate

- School of Nursing, Yonsei University; Korea; 2017.
24. Dennis CL (2003). The breastfeeding self-efficacy scale: Psychometric assessment of the short form. *J Obstet Gynecol Neonatal Nurs*, 32(6):734-44.
25. Kim SH (2020). [Breastfeeding Adaptation Scale-Short Form for mothers at 2 weeks postpartum: construct validity, reliability, and measurement invariance]. *Korean J Women Health Nurs*, 26(4):326-35. [Article in Korean]
26. Helsing E (1985). Infant feeding and infectious illness. Report of the World Health Organization Copenhagen, Denmark. <https://iris.who.int/bitstream/handle/10665/272658/9789289013543-eng.pdf>
27. Cox JL, Holden JM, Sagovsky R (1987). Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry*, 150:782-6.
28. Han KW, Kim MJ, Park JM (2004). The Edinburgh Postnatal Depression Scale, Korean Version: reliability and validity. *J Korean Soc Biol Ther Psychiatry*, 10(2):201-7.
29. Koskinen KS, Aho AL, Hannula L, et al (2014). Maternity hospital practices and breast feeding self-efficacy in Finnish primiparous and multiparous women during the immediate postpartum period. *Midwifery*, 30(4): 464-70.
30. Song SM, Park MK (2016). Effects of breastfeeding empowerment program on breastfeeding self-efficacy, adaptation and continuation in primiparous women. *J Korean Acad Nurs*, 46(3):409-19.
31. Lee BH, Bang KS (2020). A self-efficacy promotion program for the continuation of breastfeeding for mothers of premature infants. *Perspectives in Nursing Science*, 17(2):90-8.
32. Akter S, Tasnim S, Bhuiyan MMA, et al (2015). A study on post partum breast problems of mothers attending at lactation management center (LMC). *Bangladesh Med J*, 44(3):136-9.
33. Korean Statistical Information Service (2020). Survey on postpartum care, Ministry of health and welfare, Korea. https://kosis.kr/statHtml/statHtml.do?orgId=117&tblId=DT_117101_2020A043&conn_path=I2
34. Xia M, Luo J, Wang J, et al (2022). Association between breastfeeding and postpartum depression: A meta-analysis. *J Affect Disord*, 308:512-9.
35. Avilla JCd, Giugliani C, Bizon AMBL, et al (2020). Association between maternal satisfaction with breastfeeding and postpartum depression symptoms. *Plos One*, 15(11):e0242333.