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Original Research Paper

Paper and mobile-based education to improve knowledge and self-efficacy on exclusive breastfeeding

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Abstract
Knowledge and self-efficacy are important elements of exclusive breastfeeding success. Educational interventions with various media are conducted to improve exclusive breastfeeding. The study aimed to explain the effectiveness of education using a combination of leaflets (paper), e-leaflets, and videos with WhatsApp media to increase knowledge and self-efficacy of breastfeeding. The research design was a pre and post-test without a control group and involved a group of 20 pregnant women in the second and third trimesters. The intervention was carried out for 4 weeks. Knowledge measurement and Prenatal Breastfeeding Self-Efficacy Scale (PBSE) scores were conducted before and after the intervention. The intervention significantly improved maternal knowledge (pre-test: 17.9 ± 1.447; post-test: 18.55 ± 1.234; p=0.046) but did not significantly increase PBSE scores (pre-test: 63.5 ± 7.54; post-test: 65.35 ± 9.19; p=0.327). Education should employ diverse approaches and media, targeting both mothers and their immediate social environment, particularly families.

Keywords: breastfeeding; breastfeeding self-efficacy; knowledge; mobile-based education; paper-based education

1. Introduction

Breastfeeding is a crucial health intervention for infants. Breastfeeding can reduce the risk of exposing infants to life-threatening infectious diseases (Basu et al., 2020). Infants who are exclusively breastfed for 6 months have lower morbidity than those who are not exclusively breastfed. Breastfeeding on the first day and in the first hour prevents infant mortality by 16% and 22%, respectively. Breast milk can reduce the risk of gastrointestinal infections, diarrhea, lower respiratory tract, otitis media, and allergies, and is protective against protein deficiency. The baby's immune system will be boosted and may protect the baby later in life from chronic conditions such as obesity and diabetes. Breast milk also benefits infants' health and cognitive development (Galipeau et al., 2018; Sari & Hanafi, 2018; Shafaei et al., 2020; Vakilian et al., 2020). In addition to having a positive impact on the baby, breastfeeding can also have a positive impact on the mother. For the mother, breastfeeding will protect her from several types of cancer, reduce postpartum weight, strengthen the relationship between mother and baby, and prevent uterine involution. A failure in breastfeeding will cause health risks for the mother and her baby (Basu et al., 2020; Sari & Hanafi, 2018; Vakilian et al., 2020).

Only 38% of mothers exclusively breastfeed until six months of age globally, and only 2 per 5 of babies worldwide are exclusively breastfed. According to Basic Health Research (RISKESDAS) data, 53.5%, or only half of the 2.3 million infants less than 6 months old, are exclusively breastfed in Indonesia, a 12% decrease from the 2019 figure (Sari & Hanafi, 2018; Unicef, 2022).

Knowledge and self-efficacy of parents, especially mothers, determine decisions related to the pattern and type of food given to children, including exclusive breastfeeding, weaning time, type, and timing of complementary feeding (Chipojola et al., 2020). These will affect children's nutritional status,

growth, and development (Bahorski et al., 2019). Breastfeeding is associated with higher levels of intelligence and economic capability in adulthood. Therefore, interventions to increase breastfeeding coverage are important, including education to improve maternal knowledge and self-efficacy (Rollins et al., 2016).

Research has shown that education through home visits by peer mentors effectively increases self-efficacy (Lutenbacher et al., 2018). Other studies have also shown that proactive telephone calls from peer volunteers conducted in an empathetic, non-judgmental manner are helpful for confidence and breastfeeding continuation in primiparas (Hore et al., 2022). This study combines paper-based and mobile-based education. This study aim to examine the effectiveness of a combination of leaflet and mobile-based education to improve knowledge and self-efficacy for exclusive breastfeeding among mothers in peri-urban areas.

2. Research Methods

Research with a pre-post test design without a control group was conducted to determine the effect of educational interventions on the knowledge and self-efficacy of pregnant women to breastfeed. The study was conducted from July to September 2023 in Godean District, Sleman Regency. Godean is one of the periurban areas on the western edge of Yogyakarta City. The study population was pregnant women in trimesters 2 and 3 who attended pregnant women's classes at the Godean II Health Center, actively using WhatsApp communication media with cellphones, willing to be involved in the study, and following the entire research flow. Mothers who had breast problems or psychiatric disorders were excluded from this study. We did not undertake sampling, but rather included the total population, specifically mothers in their second and third trimesters of pregnancy during the study period in that location.

The intervention provided in this study is the provision of education by providing education in the form of leaflets that can be brought and read at home (first meeting), then continued with the provision of e-leaflets and educational videos in the second week, e-leaflets in week 3, and post-test in week 4. The outcome of this study was the knowledge and self-efficacy of breastfeeding in pregnant women, which was assessed by comparing the pre-test and post-test scores measured using the breastfeeding knowledge questionnaire and the Prenatal Breastfeeding Self-Efficacy Scale (PBSE) questionnaire.

The breastfeeding knowledge questionnaire was developed by Junaedah (2020). Respondents only chose between true and false when filling out the questionnaire. This statement consists of two types, namely favorable and unfavorable. Favorable items contain positive statements, while unfavorable items contain negative statements. The correct answer will get 1 point, and the wrong answer will be given 0 points. In favorable scoring, it is given a value of 1 if it is correct and zero if it is wrong; in unfavorable, it is given a value of 1 if it is wrong and zero if it is correct. The questionnaire contained 20 questions regarding knowledge of exclusive breastfeeding. The questionnaire has passed the validity and reliability test with an r-alpha value of 0.981 in previous studies.

Merdikawati and Choiriyah (2019) modified the Prenatal Breastfeeding Self-Efficacy Scale (PBSES) questionnaire (Merdikawati & Choiriyah, 2019). Their research used it to measure self-efficacy in breastfeeding in second—and third-trimester pregnant women. This translated PBSES has 20 questions using a 1-4 Linkert scale (strongly agree, agree, disagree, strongly disagree) with a score scale of 20-80.

The research was conducted after passing the ethical review by the ethics commission of FK UII with letter number 21/Ka/Kom/Et/70/KE/VI/2023 and has received permission from the Sleman Regency Health Office with number 070/664. Data analysis used the SPSS program. The effectiveness of the intervention was measured by comparing pre-test and post-test scores. Because the data were not

normally distributed, a non-parametric statistical test was used, namely the Wilcoxon test. The research flow is presented in Figure 1.

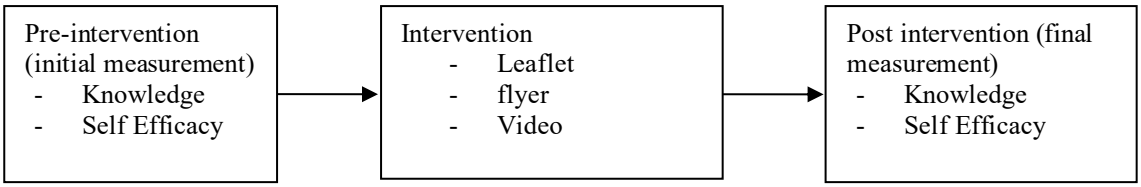

Figure 1. Research Flow

3. Results and Discussion

3.1.Subject Characteristics

The study involved 20 pregnant women in the second or third trimester at the Godean 2 Health Center, Sleman Regency, Yogyakarta Special Region. The majority of the subjects were 20-29 years old (55.0%), with the highest formal education of senior high school (55.0%), housewives (60.0%), and pregnancy age of trimester 3 (70.0%). These findings suggest that the majority of women who attend prenatal classes are relatively young and have a secondary education. The characteristics of the study subjects are presented in Table 1.

Table 1. Characteristics of The Subjects

Variables	N	Persentage (%)
Mother's age		
20-29 years old	11	55.0
30-39 years old	7	35.0
40-49 years old	2	10.0
Last Education		
Junior High School	2	10.0
Senior High School	11	55.0
Diploma	3	15.0
Bachelor's degree	3	15.0
Post graduate	1	5.0
Jobs		
Housewife	12	60.0
Employees	5	25.0
Self-employed	3	15.0
Pregnancy Age		
2nd Trimester	6	30.0
3th Trimester	14	70.0

3.2.Knowledge and PBSE Scores

Table 2 shows that knowledge and self efficacy scores after the intervention were higher than before the intervention. This increase occurred not only in the average scores, but also in the minimum and maximum scores in all age groups. The highest increase in knowledge scores occurred in the 30-39 age group and the second trimester (1.29 points), as well as an increase in self efficacy scores. The highest increase in PBSE scores also occurred in the 30-39 age group (3.26 points). Previous researchers stated that age 20-35 is ideal for optimally producing breast milk. At that age, women are expected to have physical and spiritual maturity (Safitri et al., 2021).

Table 2. Knowledge and PBSE Scores Before and After The Intervention by Maternal Age Group And Gestational Age

No.	Respondent Characteristics	Min-Max		Average		Difference
		Pre	Post	Pre	Post	
A.	**Knowledge Score**					
	Mother's age					
	20-29 years old	14-20	15-20	17.73	18.00	0.27
	30-39 years old	16-20	19-20	18.14	19.43	1.29
	40-49 years old	17-19	18-19	18.00	18.50	0.50
	Pregnancy Age					
	Trimester 2	16-20	18-20	17.50	18.83	1.33
	Trimester 3	14-20	15-20	18.07	18.43	0.36
B.	**PBSE Score**					
	Mother's age					
	20-29 years old	55-72	53-80	61.90	64.00	2.10
	30-39 years old	55-80	51-77	66.14	69.40	3.26
	40-49 years old	58-68	56-75	63.00	65.50	2.50
	Pregnancy Age					
	Trimester 2	55-74	51-76	60.50	64.17	3.67
	Trimester 3	55-80	56-80	64.79	65.86	1.07

The level of knowledge increased after the intervention compared to before. The number of subjects with good knowledge increased after the intervention, from 95% to 100% (Table 3).

Table 3. Knowledge Level Before and After Intervention

Knowledge Level	Before	Percentage (%)	After	Percentage (%)
Good	19	95.0	20	100.0
Less	1	5	0	0.0

With 20 subjects, the normality test was carried out using the Shapiro-Wilk test. The normality test results showed abnormal data distribution, so researchers used an alternative non-parametric test, the Wilcoxon test. Knowledge and self-efficacy scores after the intervention (post-test) increased compared to before the intervention (pre-test) in all maternal and gestational age groups. The statistical test results showed that there was a significant difference between the mean pre-test and post-test scores for knowledge scores but not significant for PBSE scores. Table 4 shows that the mean pre-test score was 63.50 ± 7.54, and the post-test score was 65.35 ± 9.19. ± The mean pre-test and post-test were 1.85 ± 8.2 (p=0.327). The results of statistical tests of pre-test and post-test values are presented in Table 4.

Table 4. Statistical Test Results

	Mean (SD)	Difference	p-value
Knowledge Score			
Pre-test	17.90 (1,447)	0.65	0.046*
Post-test	18.55 (1,234)		
PBSE Score			
Pre-test	63.50 (7.54)	1.85 (8.22)	0.327
Post-test	65.35 (9.19)		

*p-value<0.05

This study's results indicate that providing educational interventions through leaflets, E-leaflets, and educational videos can significantly improve maternal knowledge (p-value = 0.046). It can be indirectly said that education using this media effectively increases pregnant women's knowledge. This study's results align with research conducted by Hayatiningrum et al. (2023), which states that education with animated video media and leaflets can improve mothers' knowledge and skills about breastfeeding techniques. Previous research conducted by Adam et al. (2021) showed that video education is as effective as face-to-face counseling, so it can be a solution and a more practical alternative for delivering educational material. In addition, research by Idris and Elvinasari (2020) states that the provision of leaflets as educational media affects the knowledge of pregnant women about exclusive breastfeeding in the Tinggimoncong Health Center working area in 2019. The short duration of the video, as well as leaflets and e-leaflets that contain concise material, can be an advantage in presenting educational material, increasing mothers' knowledge of exclusive breastfeeding. Another important aspect is that it can help clarify the message conveyed. Information conveyed verbally sometimes cannot be understood, especially if the material is incomplete. At this time, the role of media is needed as a tool in clarifying learning messages.

Education is one of the interventions that aims to prepare and improve breastfeeding practices. This intervention can target mothers, families, or communities. In its implementation, education can involve health workers, cadres, or other community elements, such as peer groups (Rollins et al., 2016). Leaflets, e-leaflets, and educational videos are effective as educational media. As information media, the presence of images or photos can arouse motivation and interest in learning and can remember the message related to the image or photo. Leaflets, e-leaflets, and educational videos can be read anytime and anywhere. So that it can be watched or read without requiring a special place and time (Hayatiningrum et al., 2023).

This study also showed that educational interventions, such as providing leaflets brought to the home, e-leaflets, and educational videos through WhatsApp to pregnant women, increased breastfeeding self-efficacy, but it was not statistically significant. The previous study showed no significant difference between the intervention and control groups based on age and gestational age. However, at one month of postpartum measurement, the increase in self-efficacy in the intervention group was higher than in the control group (Vakilian et al., 2020). Another study on primiparous mothers showed that a smartphone-based educational intervention for 3 months significantly improved mothers' knowledge, behavior, and self-efficacy for breastfeeding (Seyyedi et al., 2021). This difference may be related to the duration of education. Longer duration of intervention allows for repetitive information. Providing repeated information can increase confidence in the information provided and reduce doubt (Corneille et al., 2020).

Intention and self-efficacy to breastfeed are two factors that play an important role and are directly related to the success of exclusive breastfeeding for 6 months. However, other factors are indirectly related to exclusive breastfeeding. Level of knowledge and social support are associated with intention and self-efficacy (Li et al., 2023). The experience of successful or unsuccessful breastfeeding in previous births also affects a mother's self-efficacy to breastfeed. Mothers who have experienced failure tend to have lower self-efficacy than successful mothers (Nilsson et al., 2020).

Most of the subjects in this study had a high school education level and above and had high pre-treatment self-efficacy. Although the increase in self-efficacy after the intervention was not statistically significant, the results of this study cannot exclude the importance of providing education through various media to improve breastfeeding self-efficacy. The utilization of social media, which is widely used by the public, has proven to be an alternative to providing information about breastfeeding (Uzunçakmak et al., 2022). Equally important is social support from the immediate environment, especially family. Positive family support can reduce the stress often experienced by postpartum

mothers and has been shown to increase breastfeeding self-efficacy (Mercan & Selcuk, 2021). Therefore, education that involves the family is highly recommended.

4. Conclusion

Intervention with a combination of leaflet and mobile-based education was shown to improve the level of knowledge and PBSE score. Knowledge scores after the intervention increased significantly, while PBSE scores increased, although not significantly. These results show that it is important to educate pregnant women to improve the success of exclusive breastfeeding. We must formulate and research more effective educational methods to increase breastfeeding knowledge and self-efficacy.

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