



**19th International Conference on New Findings
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**Design, Development, and Evaluation of the LactoCare
Mobile Application for Improving Breastfeeding Knowledge
and Attitudes Among Lactating Mothers: Study Protocol for
a Quasi-Experimental Study**

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Abstract

Background

Breastfeeding is one of the most effective strategies for promoting maternal and infant health; however, many mothers experience challenges due to insufficient knowledge, misconceptions, and inadequate support during the breastfeeding period. Mobile health (mHealth) technologies provide an opportunity to deliver continuous, accessible, and evidence-based educational support. This study aims to design, evaluate, and assess the effectiveness of the **LactoCare** mobile application on breastfeeding knowledge and attitudes among lactating mothers.

Methods:

The educational content of the application will be developed based on evidence from previous studies and breastfeeding guidelines. The application will include structured educational materials addressing breastfeeding principles, benefits, correct breastfeeding techniques, and management of common breastfeeding challenges. The effectiveness of the intervention will be evaluated by comparing changes in mothers' knowledge and attitude scores before and after using the application. In addition, the usability and user acceptance of the application will be assessed.

Expected Results:

Of 90 screened records, 38 studies met the eligibility criteria and were included in the qualitative synthesis. Gestational diabetes mellitus and preeclampsia were the most frequently investigated outcomes. Common algorithms included logistic regression, random forest, support vector machine, XGBoost, gradient boosting, deep learning, and ensemble methods. Major predictors included maternal characteristics, obstetric history, laboratory biomarkers, blood pressure, ultrasound findings, and electronic health record variables. Reported AUC values ranged approximately from 0.70 to 0.95. Limited external validation and insufficient assessment of clinical applicability were frequently observed.

Conclusion:

The development and evaluation of the **LactoCare** mobile application may provide evidence regarding the potential role of mHealth-based educational interventions in improving breastfeeding knowledge and attitudes among mothers. The findings of this study can contribute



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to the development of accessible and evidence-based digital educational tools to support breastfeeding practices.

Keywords: Breastfeeding, Lactating Mothers, Breastfeeding Education, Knowledge, Attitude, Mobile Application, Mobile Health (mHealth)

1.Introduction

Breastfeeding is recognized as one of the most effective health-promoting practices for infants and mothers. Breast milk provides essential nutrients and immune components required for infant growth and protection against common childhood illnesses. Despite extensive evidence supporting the benefits of exclusive breastfeeding, many mothers discontinue breastfeeding earlier than recommended due to insufficient knowledge, negative attitudes, misconceptions, and difficulties in managing common breastfeeding problems.

Previous studies have shown that maternal knowledge and attitudes are among the important factors influencing breastfeeding initiation and continuation. Mothers who have inadequate information regarding breastfeeding techniques, milk sufficiency, and management of breastfeeding challenges are more likely to experience anxiety and reduced confidence, which may negatively affect breastfeeding outcomes.

Traditional breastfeeding education programs, including face-to-face counseling and printed educational materials, are often limited by restricted access, time constraints, and lack of continuous support after childbirth. In recent years, mobile health (mHealth) technologies have created new opportunities for delivering health education through accessible, interactive, and personalized platforms. Mobile applications can provide mothers with continuous access to reliable educational resources and support during different stages of breastfeeding. Previous studies have indicated that smartphone-based breastfeeding interventions may improve maternal self-efficacy, knowledge, and attitudes toward breastfeeding. However, many existing breastfeeding applications have been developed in different cultural contexts, and limited evidence exists regarding the effectiveness of locally adapted mobile applications designed according to the educational needs of Iranian mothers. Therefore, this study aims to design, develop, and evaluate the effectiveness of the **LactoCare** mobile application on breastfeeding knowledge and attitudes among lactating mothers.

2. Methods



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1-1- Study Design and Setting

This study will be conducted using a quasi-experimental pre-test/post-test design among lactating mothers referring to Tapesht Midwifery Clinic in Mashhad, Iran. The study will be performed over a period of one year in 2026.

The research will be conducted in three phases:

1-1-1 Phase 1: Development of Educational Content

In the first phase, a comprehensive review of scientific literature, breastfeeding guidelines, and previous educational interventions will be conducted to identify essential educational topics required for breastfeeding support. The extracted information will be organized into structured educational modules focusing on breastfeeding benefits, breastfeeding techniques, exclusive breastfeeding recommendations, and management of common breastfeeding problems.

1-1-2 Phase 2: Design and Development of the LactoCare Application

Based on the extracted educational content, the **LactoCare** mobile application will be designed and developed. The application will include structured educational materials, interactive learning components, and accessible breastfeeding resources. Educational scenarios and multimedia components will be developed using digital content development tools.

Following development, the usability and functionality of the application will be evaluated by relevant experts and potential users, and necessary modifications will be performed before implementation.

1-1-3 Phase 3: Evaluation of Application Effectiveness

Eligible lactating mothers will use the LactoCare application for four weeks. Participants will receive breastfeeding educational content through the application and will be encouraged to review the materials regularly.

Breastfeeding knowledge and attitudes will be assessed before and after the intervention using validated questionnaires:

- **Breastfeeding Knowledge Questionnaire (BFKQ)** for assessing mothers' knowledge regarding breastfeeding principles.
- **Iowa Infant Feeding Attitude Scale (IIFAS)** for evaluating mothers' attitudes toward breastfeeding.

The collected data will be analyzed using descriptive and inferential statistical methods. Paired statistical tests will be used to compare changes in knowledge and attitude scores before and after the intervention. Statistical significance will be considered at $p < 0.05$.



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2- Participants and Eligibility Criteria

The study population will include lactating mothers attending Tapesht Midwifery Clinic in Mashhad.

Inclusion criteria will include:

- Mothers in late pregnancy (after week 32) or early postpartum period
- Access to a smartphone
- Ability to read and write Persian
- No medical contraindication for breastfeeding
- Providing informed consent for participation

Exclusion criteria will include:

- Withdrawal from the study at any stage
- Development of serious maternal or infant medical conditions affecting breastfeeding
- Participation in other breastfeeding educational programs during the intervention period

The estimated sample size will be calculated based on paired mean comparison, considering a significance level of 0.05, statistical power of 80%, and expected participant dropout. The final sample size is estimated at approximately 86 participants.

2-1- Ethics and Dissemination

Ethical approval for this study has been submitted to the relevant ethics committee and is currently under review. Data collection will begin only after obtaining ethical approval. All participants will be informed about the study objectives, procedures, potential benefits, and their rights before participation. Written informed consent will be obtained from all participants. Participation will be voluntary, and participants will have the right to withdraw from the study at any stage without any consequences. All collected information will be kept confidential and will only be used for research purposes.

The findings of this study will be disseminated through publication in a peer-reviewed scientific journal and presentation at relevant scientific conferences. If the LactoCare application demonstrates acceptable effectiveness and usability, it may be considered as an educational support tool in maternal and child health services

3- Expected Results

The LactoCare application is expected to provide a structured and evidence-based educational platform for breastfeeding mothers. The developed application will address key educational needs,



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including breastfeeding benefits, correct breastfeeding techniques, management of common challenges, and strategies to support continued breastfeeding.

It is expected that participants will demonstrate improved breastfeeding knowledge and more positive attitudes after using the application. Additionally, evaluation of application usability will provide information regarding user acceptance and feasibility of implementing mobile-based breastfeeding education in maternal health services

4- Discussion

Previous studies have demonstrated the potential of mobile-based interventions in supporting breastfeeding education. Smartphone applications have been reported to improve maternal breastfeeding self-efficacy and knowledge by providing continuous access to educational resources. Similarly, studies evaluating breastfeeding-related mobile applications have shown improvements in maternal knowledge and attitudes after exposure to digital educational interventions.

Despite these findings, differences in cultural background, healthcare systems, and educational needs highlight the importance of developing locally appropriate applications. The LactoCare application is designed to address this gap by incorporating evidence-based breastfeeding education tailored to Iranian mothers.

The findings of this study may provide preliminary evidence regarding the feasibility and effectiveness of mobile applications as complementary educational tools in breastfeeding support programs

5. Conclusion

The development and evaluation of the LactoCare mobile application may contribute to improving breastfeeding education by providing mothers with continuous, accessible, and evidence-based information. If effective, this application could be considered as a supportive educational tool within maternal and child health services to enhance breastfeeding knowledge and attitudes among mothers

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