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SIMULATION-BASED BREASTFEEDING EDUCATION: A LITERATURE REVIEW

SİMÜLASYON DESTEKLİ EMZİRME UYGULAMALARI: LİTERATÜR DERLEMESİ

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Abstract
Breastfeeding is critically important for protecting and promoting maternal and infant health; however, it is a complex process influenced by numerous individual, sociocultural, and environmental factors. The mother's level of knowledge, self-confidence, and professional support are among the key determinants in initiating and maintaining breastfeeding. In this context, breastfeeding education stands out as one of the fundamental interventions for increasing breastfeeding success. However, traditional educational approaches, which are often based on passive learning, may limit the effective acquisition of breastfeeding as a psychomotor skill. In recent years, simulation-based education methods, which have become widespread in health education, allow for the simultaneous development of cognitive, affective, and psychomotor skills by providing real-life experiences in a safe environment. The purpose of this review is to examine simulation-based applications used in breastfeeding education, evaluate their effects on breastfeeding skills and self-efficacy, and provide recommendations for healthcare professionals based on the current literature. The studies reviewed demonstrate that simulation-based breastfeeding education improves mothers' breastfeeding skills, increases their self-confidence, and is effective in translating knowledge into practice.

Keywords: Breastfeeding, Education, Infant, Mother, Simulation

Öz
Emzirme, anne ve bebek sağlığının korunması ve geliştirilmesi açısından kritik öneme sahip olmakla birlikte, çok sayıda bireysel, sosyokültürel ve çevresel faktörden etkilenen karmaşık bir süreçtir. Emzirmenin başlatılması ve sürdürülmesinde annenin bilgi düzeyi, özgüveni ve profesyonel destek alması önemli belirleyiciler arasında yer almaktadır. Bu bağlamda emzirme eğitimleri, emzirme başarısını artırmada temel müdahalelerden biri olarak öne çıkmaktadır. Ancak geleneksel eğitim yaklaşımlarının çoğunlukla pasif öğrenmeye dayanması, psikomotor bir beceri olan emzirmenin etkin biçimde kazandırılmasını sınırlayabilmektedir. Son yıllarda sağlık eğitiminde yaygınlaşan simülasyon temelli eğitim yöntemleri, gerçek yaşam deneyimlerini güvenli bir ortamda sunarak bilişsel, duyuşsal ve psikomotor becerilerin birlikte geliştirilmesine olanak tanımaktadır. Bu derlemenin amacı, emzirme eğitiminde kullanılan simülasyon temelli uygulamaları incelemek, bu uygulamaların emzirme becerileri ve öz-yeterlilik üzerindeki etkilerini değerlendirmek ve mevcut literatür doğrultusunda sağlık profesyonellerine yönelik öneriler sunmaktır. İncelenen çalışmalar, simülasyon temelli emzirme eğitimlerinin annelerin emzirme becerilerini geliştirdiğini, özgüvenlerini artırdığını ve bilgiyi uygulamaya dönüştürmede etkili olduğunu göstermektedir.

Anahtar Kelimeler: Emzirme, Eğitim, Bebek, Anne, Simülasyon

1. Introduction

Breastfeeding is the most effective method for delivering breast milk the most valuable nutrient for a newborn's healthy start in life, maintenance of health, and support of development to the infant. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF)

recommend that newborns should begin breastfeeding within the first half hour after birth, be exclusively breastfed for the first six months of life, and continue breastfeeding with the addition of nutritionally adequate and safe complementary foods from six months until at least two years of age (World Health Organization, 2023).

Globally, approximately three quarters of infants are born in hospitals and other healthcare facilities providing birth services, and the antenatal and postnatal care practices offered in these settings directly affect the breastfeeding process and maternal and infant health outcomes. Mothers need quality care and the support of trained healthcare workers to initiate and maintain breastfeeding, anticipate and prevent potential difficulties, and appropriately manage problems that arise. In response to these needs, the Ten Steps to Successful Breastfeeding were developed by WHO and UNICEF in 1989 to define best practices in perinatal maternal and newborn care, and since 1991, the Baby-Friendly Hospital Initiative has aimed to integrate these practices into health systems. Updated in 2018 in light of comprehensive evidence, the Ten Steps and the restructured Baby-Friendly Hospital Initiative stand out as an effective public health approach for protecting, supporting, and ensuring the sustainability of breastfeeding. However, current data show that in only 14% of countries do the majority of births occur in baby-friendly health facilities, and the rate of postpartum breastfeeding observation by trained healthcare workers is limited to 20%; this situation indicates that the Ten Steps need to be implemented more widely and effectively within health systems to achieve the global targets of 40% set for 2030 (UNICEF, 2025; WHO, 2025).

When examining UNICEF's 2017 and 2024 reports, Turkey is among the countries that have recorded at least a 10 percentage point increase in exclusive breastfeeding rates. The most recent estimate for exclusive breastfeeding among infants aged 0–5 months in Turkey, from 2017, is 30%, which is reported to represent an increase of over 50% compared to the value reported in the 2017 report (UNICEF, 2025). Since breast milk is considered the best source of nutrition for infants under six months, maintaining breastfeeding is extremely important. To effectively continue breastfeeding and increase breastfeeding rates, it is essential to identify the factors affecting the breastfeeding process and plan and implement appropriate interventions targeting these factors (Cohen et al., 2018).

Breastfeeding is not merely a biological process; it is a complex behavior influenced by numerous factors including the mother's individual characteristics, sociocultural and economic status, mode of delivery, health system support, previous breastfeeding experiences, and environmental conditions. These factors affecting breastfeeding success can be both inhibitory and supportive. The mother's age, education and socioeconomic level, pregnancy planning status, mode of delivery, and level of knowledge about breastfeeding are among the important determinants in initiating and maintaining breastfeeding. Additionally, conditions such as health problems in the newborn, preterm birth, low birth weight, and birth complications can make it difficult to initiate breastfeeding in the early period (Erçin & Köseoğlu, 2022; Tang et al., 2019). While some of these factors are beyond the direct control of parents, the literature emphasizes that the mother's level of knowledge, self-confidence, and professional support in breastfeeding are determinants in initiating and maintaining breastfeeding (Cohen et al., 2018; Erçin & Köseoğlu, 2022; Tang et al., 2022).

Breastfeeding education is among the most effective interventions for increasing breastfeeding success (Dantas et al., 2022). Structured breastfeeding education provided during the prenatal and postnatal periods has been shown to positively affect mothers' breastfeeding knowledge level, self-efficacy perception, and breastfeeding continuity (Iliadou et al., 2018; Piro & Ahmed, 2020; Tang et al., 2022). However, traditional educational approaches, which are often based on passive learning, may limit the effective learning of breastfeeding as a psychomotor skill (Mulcahy et al., 2022). Today, simulation-based applications stand out as an innovative field that is increasingly developing and achieving successful results in health education. Simulation-based education allows for the simultaneous development of cognitive, affective, and psychomotor skills by enabling individuals to experience real-life situations in a safe environment (Motola et al., 2013). The use of simulation in breastfeeding education has been reported to be effective in improving mothers' ability to apply correct breastfeeding positions, develop milk expression skills, and increase breastfeeding self-efficacy (Beatrice et al., 2020; Webber et al., 2021). Accordingly, this review aims to examine simulation-based breastfeeding applications.

2. Supportive Interventions Used to Increase Breastfeeding Success

Breastfeeding education can be provided to individuals, groups, families, or broader communities. These educational programs may utilize verbal instruction, media and mass communication tools, and demonstration and practice methods (Gavine et al., 2022). In most studies aimed at increasing breastfeeding success

rates and supporting sustainability, educational programs are directed at women, including prenatal group education, individual counseling, and peer support interventions (Gavine et al., 2022; Iliadou et al., 2018). These studies demonstrate that effective breastfeeding education can increase awareness and improve knowledge levels among participants (Iliadou et al., 2018; Piro & Ahmed, 2020). However, in these educational programs, women generally assume a passive role (Kaiza & Joho, 2023; Webber et al., 2021). Since breastfeeding is a psychomotor skill, learning through active participation in a realistic environment is essential for successful skill acquisition and achieving competency, which aligns with adult education principles emphasizing that the most effective learning occurs through direct involvement in the educational process (Motola et al., 2013). Given the limitations of traditional teaching methods in enhancing breastfeeding knowledge and practices (Kaiza & Joho, 2023), there has been a growing shift toward active learning approaches in which participants explore and experience educational content directly. Active learning techniques, such as role-playing and simulation, enable deeper engagement with the material and have been shown to be more effective than passive methods such as reading or lecture-based instruction (Beatrice et al., 2020).

2.1. Simulation-Based Breastfeeding Education

Simulation involves mimicking the behavior of a real situation or process, and learners respond as if they were reacting to the situation under real conditions. This is an artificially planned situation using tools or mannequins as a representation of real life (Jeffries & National League for Nursing, 2012; Motola et al., 2013). From the perspective of both learners and health educators, simulation offers distinct advantages. Learners develop skills by translating knowledge into practice and can apply what they have learned, make decisions, and solve problems when they encounter a similar situation (Kaiza & Joho, 2023). Health educators, in turn, can use simulation as an educational tool for simultaneously developing cognitive, affective, and psychomotor skills in their students. Three levels of fidelity have been identified in simulation-based education: low, moderate, and high-fidelity simulators (Motola et al., 2013; Ryall et al., 2016).

Low-fidelity simulators: These are generally static, cannot fully reflect real-life experience or contextual situations, and the materials used do not completely match the task being practiced. Low-fidelity simulation models are used in the first stage of skills training for acquiring and developing basic psychomotor competencies. These models include specific anatomical region models such as breast models used for practicing latch techniques and positioning, pelvis and uterus organ models, and gynecological examination mannequins (Akalın & Şahin, 2019; Amin et al., 2019). In the context of breastfeeding education, low-fidelity simulators such as knitted or fabric breast models and infant dolls are commonly used to teach mothers correct positioning and attachment techniques (Kaiza & Joho, 2023; Agrina et al., 2019).

Moderate-fidelity simulators: These offer a higher level of realism compared to low-fidelity simulators. These models include physiological indicators such as heart, lung, and respiratory sounds, as well as pulse beats (Amin et al., 2019).

High-fidelity simulators: These simulators use realistic and sophisticated materials to represent the real environment and add a high level of realism to training through the ability to adapt scenarios to physical signs and clinical situations (Amin et al., 2019). Although high-fidelity simulators are widely used in various clinical training areas, their application specifically in breastfeeding education remains limited in the literature. However, the potential of these advanced simulators to create realistic breastfeeding scenarios, including infant feeding cues and maternal-infant interaction, represents a promising area for future development (Jeffries & National League for Nursing, 2012).

In the context of breastfeeding education, simulation-based methods offer several specific advantages:

- Allowing mothers to practice correct breastfeeding positions and latch techniques in a safe, non-stressful environment,
- Enabling mothers to learn from errors without risk to the infant, viewing mistakes as a natural part of the learning process,
- Developing manual breast milk expression skills through hands-on practice with realistic breast models (Beatrice et al., 2020),
- Building maternal self-confidence and self-efficacy in breastfeeding before the actual experience (Webber et al., 2021),
- Enabling multiple mothers or healthcare students to practice simultaneously on standardized scenarios,
- Providing immediate feedback from trained instructors to correct positioning and technique errors,
- Supporting the transfer of learned skills to real breastfeeding situations, thereby improving breastfeeding initiation and duration (Agrina et al., 2019; Kaiza & Joho, 2023).

Considering these advantages of simulation, simulation-based education methods appear to have significant potential not only in developing clinical skills but also in improving the quality of

education provided during pregnancy. Traditional breastfeeding education provided during the prenatal period is often theoretical and narrowly focused, which may limit pregnant women's adequate preparation for the real experience of breastfeeding. Therefore, simulation-based approaches, which offer the opportunity to experience real-life scenarios in a safe environment, stand out as an effective educational method that supports pregnant women in starting the breastfeeding process more prepared, confident, and aware (Sayres & Visentin, 2018; Tang et al., 2022). Research findings consistently support the effectiveness of simulation in breastfeeding education. Webber et al. (2021) found that mothers who received simulation training could hold their babies to the breast correctly and guide other mothers. Agrina et al. (2019) demonstrated that simulation-supported breastfeeding counseling helped learners retain skills through repetition, while Beatrice et al. (2020) reported that 97% of mothers acquired adequate milk expression skills after simulation-based training, underscoring the importance of hands-on demonstration in skill acquisition.

In the literature, studies on breastfeeding education using simulators with particularly high-fidelity levels are not encountered; however, simulation-based training using low to moderate-fidelity simulators has been observed to be effective in improving women's breastfeeding skills (Agrina et al., 2019). Increasing variation and difficulty levels in simulations and adapting them to participants' weaknesses appear to be important areas to focus on in the future (Amin et al., 2019), and quality breastfeeding education that includes simulation-based clinical training opportunities is a critical component in improving care for breastfeeding mothers (Webber et al., 2021).

3. Conclusion

This review reveals that breastfeeding is a multidimensional process and that education-based interventions play a central role in increasing breastfeeding success. The literature shows that simulation-based breastfeeding education positively affects mothers' skill acquisition, self-efficacy perception, and breastfeeding practices compared to traditional approaches. Particularly, simulation-based education provided during pregnancy is observed to support mothers in starting the breastfeeding process more prepared, aware, and confident.

Simulation-based education offers significant advantages in breastfeeding training by providing a safe learning environment where mothers can practice without fear of making mistakes. Unlike traditional didactic methods that rely primarily on verbal instruction and passive learning, simulation allows mothers to actively engage with realistic scenarios, develop muscle memory for correct positioning and latch techniques, and build confidence through repeated practice. This experiential learning approach aligns with adult learning principles, which emphasize that meaningful learning occurs through active participation and hands-on experience. The findings of this review also highlight the potential role of simulation-based education in addressing common breastfeeding challenges. Many mothers discontinue breastfeeding early due to perceived insufficient milk supply, difficulties with latching, nipple pain, or lack of confidence. By providing opportunities to practice problem-solving strategies and troubleshooting techniques in a controlled environment, simulation-based training can better prepare mothers to overcome these challenges when they arise in real-life situations. Furthermore, the immediate feedback provided during simulation exercises enables mothers to correct errors and refine their techniques before encountering actual breastfeeding situations.

From a healthcare system perspective, integrating simulation-based breastfeeding education into prenatal care programs could contribute to achieving global breastfeeding targets set by WHO and UNICEF. Healthcare professionals, including nurses, midwives, and lactation consultants, can benefit from simulation training to enhance their counseling skills and ability to support breastfeeding mothers effectively. The standardization of simulation-based training protocols could ensure consistent quality of breastfeeding education across different healthcare settings.

However, the limited number of studies on the use of high-fidelity simulators in breastfeeding education indicates the need for further research in this area. Most existing studies have utilized low to moderate-fidelity simulators, and the comparative effectiveness of different fidelity levels remains unclear. Additionally, the cost-effectiveness of simulation-based breastfeeding education, particularly when using high-fidelity equipment, requires further investigation to support widespread implementation.

In the future, it is recommended to plan studies that compare different simulation levels, evaluate long-term breastfeeding outcomes, and address integration into clinical practice. Research should also explore the optimal timing, duration, and frequency of simulation-based interventions, as well as the potential of emerging technologies such as virtual reality and augmented reality in breastfeeding education. Studies examining the impact of simulation-based training on exclusive

breastfeeding rates at six months and continued breastfeeding at one and two years would provide valuable evidence for policy makers and healthcare administrators.

The widespread adoption of simulation-based breastfeeding education is considered an effective and innovative approach that can contribute to improving maternal and infant health. By empowering mothers with practical skills and confidence, simulation-based education has the potential to increase breastfeeding initiation rates, extend breastfeeding duration, and ultimately improve health outcomes for both mothers and infants. As healthcare systems continue to seek evidence-based strategies to promote breastfeeding, simulation-based education emerges as a promising intervention worthy of further investment and research.

Ethics Committee Approval

This study is a literature review and does not involve human or animal subjects. Therefore, ethics committee approval was not required.

Author Contributions

a) Concept and design: E.C., B.K., Ş.K.E.; b) Literature review: E.C., B.K.; c) Drafting the manuscript: E.C., B.K., Ş.K.E.; e) Critical revision: Ş.K.E.; f) Final approval: E.C., B.K., Ş.K.E.

Conflicts of interest

The author declares no potential conflicts of interest relevant to this article.

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