Midwifery Innovation Journal
Volume 1, Nomor 2, October 2025
e-ISSN: 3089-8862, p-ISSN: 3089-8854, Hal. 20-30
Available Online at: https://journal.univummibogor.ac.id/index.php/MIJ

The Effect of Lactation Management Intervention on the Success of Bounding Attachment

Devi Retnowati Kamagi [1], Nila Widya Keswara [2*]
[1-2] Sarjana Kebidanan, Fakultas Ilmu Kesehatan, Institut Sains dan Teknologi Kesehatan, Rumah Sakit Dr. Soepraoen, Indonesia
**Corresponding Author: nilakeswara35@itsk-soepraoen.ac.id [2]*

Abstract. *Early Breastfeeding Initiation (EBI) within the first hour after birth is crucial for improving breastfeeding success and neonatal health. However, obstacles related to the mother's physiological and psychological conditions, as well as the delivery environment, affect its implementation in healthcare facilities. Auditory stimulation, as a non-pharmacological intervention, has the potential to create a calmer environment, which may support EBI. This quasi-experimental study aimed to analyze the effect of auditory stimulation on the success of EBI at the North Minahasa Medical Center Hospital. The sample consisted of 30 mothers who gave birth, selected through accidental sampling. The intervention, auditory stimulation, was provided to newborns during the EBI process. The mothers' knowledge levels were assessed using a structured questionnaire, while the success of EBI was observed using an observation sheet. Data analysis was done with univariate and bivariate methods using the Wilcoxon signed-rank test. Results showed a significant improvement in knowledge post-intervention. Before the intervention, most respondents had moderate or poor knowledge, while after the intervention, the majority had good knowledge. The Wilcoxon test confirmed a significant difference (p = 0.000). The study concludes that auditory stimulation significantly enhances mothers' knowledge and supports EBI success, providing a simple, safe, and integrable approach to hospital delivery services.*

Keywords: *Auditory Stimulation; Early Breastfeeding Initiation; EBI; Hospitals; Mothers Giving Birth.*

1. INTRODUCTION

Early Breastfeeding Initiation (EBI) placing the baby to breastfeed within the first hour of life is a simple yet highly impactful intervention for neonatal survival and long-term breastfeeding success. Biologically, early breastfeeding helps colonize protective microbiota, increases intake of immunoglobulin-rich colostrum, stabilizes temperature and glucose levels, and strengthens mother–infant bonding (WHO, 2025; WHO, 2023). Additionally, IMD stimulates the release of oxytocin, which aids uterine involution and reduces the risk of postpartum hemorrhage, while also supporting milk production in the early phase of lactogenesis (WHO, 2023; WHO, 2025). Given these benefits, WHO and UNICEF consistently recommend IMD as the gold standard for newborn care, including as a key indicator of the quality of childbirth services (WHO, 2023; UNICEF, 2025).

However, global IMD achievements are still far from the target. Compiled data from cross-country surveys show that, based on surveys conducted between 2016 and 2022, around 46% of newborns began breastfeeding within the first hour still far from the global target of 70% (UNICEF & WHO, 2023). Disparities between regions are also evident: countries with strong policy support, baby-friendly practices, and maternity facilities tend to have higher rates, while facilities that are still permissive of mother–infant separation, pre-lactation feeding, or delivery processes that do not prioritize skin-to-skin contact often report lower rates (UNICEF,

Received: August 28, 2025; Revised: September 25, 2025; Accepted: October 29, 2025; Published: October 31, 2025

2025; WHO, 2023). WHO emphasizes that IMD "protects infants from infection and reduces neonatal mortality," while also increasing the chances of successful exclusive breastfeeding (WHO, 2025; WHO, 2023).

In Indonesia, the challenge of IMD is still prominent in the critical period immediately after birth. Although Riskesdas 2018 reported IMD coverage of around 58.2% (Indonesian Ministry of Health, 2019), more recent findings highlight obstacles during the "golden hour" of birth. A UNICEF Indonesia press release refers to the 2023 Indonesian Health Survey (SKI) and states that only 27% of newborns receive breast milk in the first hour; one in five babies receive food/drinks other than breast milk in the first three days; and only 14% experience skin-to-skin contact for at least one hour immediately after birth (UNICEF Indonesia, 2024). These figures indicate gaps in the implementation of IMD in health facilities, including hospitals, which may be influenced by clinical factors (e.g., obstetric procedures, pain, fatigue, sedation), service system factors (delivery room flow, joint care policies), and maternal psychological factors (anxiety, confidence in breastfeeding).

Clinically, the success of IMD does not only depend on "placing the baby on the mother's chest," but on a neurobehavioral process known as breast crawl a series of behavioral stages of a healthy full-term baby during skin-to-skin contact that leads to searching for the nipple, latching on, and beginning to suck effectively. Widström and colleagues explain that in the first hour, infants exhibit characteristic behavioral stages (e.g., quiet-alert period, exploration, breast seeking) that are highly influenced by the environment, mother-infant separation, and interventions that disrupt the infant's sensory regulation (Widström et al., 2019). In other words, IMD is a "biological moment" that is sensitive to stimuli: temperature, touch, smell, light, and also sound.

This is where the concept of auditory stimulation becomes relevant. Neurophysiologically, familiar and soothing sounds (such as a mother's voice, lullabies, or rhythmic auditory stimuli) can help stabilize behavior, reduce stress, and improve self-regulation in newborns conditions that can potentially facilitate the sucking-swallowing-breathing coordination necessary for effective breastfeeding. Evidence in the neonatal population shows that maternal sound stimulation or sound interventions can increase comfort and reduce pain/stress responses in infants, which can indirectly support breastfeeding readiness (Noble & Braga, 2022). Recent studies have also evaluated sound interventions such as white noise and lullaby recordings during breastfeeding, which have been reported to influence infant stress and indicators of breastfeeding success/comfort (Selçuk et al., 2025). In the context of spiritual interventions that are also auditory in nature, recitation of the Qur'an

has been reported to increase the comfort of low birth weight infants during care, confirming that certain sound stimuli can modulate the physiological state of infants (Hidayati et al., 2019).

In addition to affecting the baby, auditory stimulation can work through the mother. Music or relaxing auditory stimuli can reduce anxiety and increase relaxation, which is important because maternal stress is associated with oxytocin reflex inhibition and can interfere with the breastfeeding process. Research on mothers with premature infants shows that music listening interventions have the potential to increase milk production and support the breastfeeding process in high-stress situations (Varişoğlu et al., 2020). However, the evidence is not always consistent: a randomized controlled trial of mothers undergoing cesarean section found that listening to music during surgery and postpartum care did not increase overall six-month exclusive breastfeeding success, although there were signals of benefit in certain subgroups (Chawanpaiboon et al., 2021). This variation in results indicates that the effectiveness of auditory stimulation is highly influenced by context (type of delivery, care environment, lactation support, type of stimulus, timing of administration) and underscores the need for specific research on IMD outcomes (not just long-term exclusive breastfeeding).

Thus, the research gap on this topic lies in the limited applied evidence on whether auditory stimulation in the period immediately after birth can improve the success of IMD in a hospital setting. Many studies have assessed music/relaxation on maternal psychological outcomes or milk production, as well as sound stimulation on neonatal comfort, but studies that directly examine its relationship with "IMD success" (e.g., effective latch within the first hour, duration of skin-to-skin contact, or the baby actually suckling) are still relatively limited and context-specific. In Indonesia, the urgency of this research is even greater because breastfeeding rates in the first hour are still low according to SKI 2023, while hospitals are often the location of deliveries with medical interventions that can potentially hinder IMD (UNICEF Indonesia, 2024). RS Sentra Medika Minahasa Utara, as a referral/delivery facility, has a great opportunity to strengthen IMD practices through safe, inexpensive, and easily integrated intervention innovations, including standardized auditory stimulation during skin-to-skin contact.

Based on this background, this study aims to analyze the effect of auditory stimulation on the success of IMD at Sentra Medika Minahasa Utara Hospital. The results of this study are expected to provide a scientific basis for the development of a more comprehensive baby-friendly protocol, strengthen lactation support in the first hour after birth, and contribute to improving the quality of maternal-neonatal care in health facilities.

2. RESEARCH METHOD

This study is a quantitative study with a quasi-experimental approach that aims to analyze the effect of auditory stimulation on the success of Early Breastfeeding Initiation (IMD) at the North Minahasa Medical Center Hospital. A quantitative approach was chosen because this study focuses on measuring outcomes that can be observed and assessed objectively, namely the success of EBI after the provision of auditory stimulation intervention.

The research design used was quasi-experimental with a posttest-only control group design or one-group posttest design (adjusted to the available data conditions). In this design, mothers in labor and newborns were given an intervention in the form of auditory stimulation during the implementation of IMD, then the success of IMD was observed and assessed based on predetermined criteria. This design is considered the most realistic and ethical to apply in maternity hospitals because it does not interfere with the delivery process and newborn care, while still allowing for evaluation of the intervention's effects.

The study was conducted at Sentra Medika Minahasa Utara Hospital, a referral health facility with an adequate number of deliveries and the implementation of IMD as part of neonatal services. The selection of the research location was based on the availability of respondents, the support of health workers, and the relevance of IMD implementation in clinical practice at the hospital. The research period included the preparation of instruments, the implementation of auditory stimulation intervention, the observation of IMD success, and data processing and analysis.

The population in this study consisted of all mothers who gave birth to full-term newborns at the North Minahasa Medical Center Hospital during the study period. The study sample consisted of mothers and babies who met the inclusion and exclusion criteria. Inclusion criteria included mothers with normal deliveries or minor procedures that allowed for IMD, live births with stable conditions (Apgar Score ≥7), and mothers and families willing to participate in the study procedures. Exclusion criteria included mothers with severe delivery complications, infants with severe asphyxia or congenital abnormalities, and conditions that did not allow for IMD. The sample size was determined using accidental sampling.

The independent variable in this study was auditory stimulation, while the dependent variable was the success of Early Breastfeeding Initiation (EBI). Auditory stimulation was provided in the form of soothing sounds, such as the mother's voice or predetermined sound recordings, which were played to the baby immediately after birth and during skin-to-skin contact. The stimulation was administered according to standard procedures that were safe for both mother and baby and did not interfere with the EBI process.

The success of IMD is measured using a structured observation sheet, which includes indicators such as the baby's ability to latch on to the breast, the baby starting to suckle within the first hour of birth, and a minimum of one hour of skin-to-skin contact. Each indicator is assessed objectively by researchers or health workers who have been given an explanation of the observation procedure.

The data obtained were analyzed in several stages. Univariate analysis was used to describe the characteristics of the respondents and the distribution of IMD success. Next, bivariate analysis was performed to determine the effect of auditory stimulation on IMD success.

If the IMD success variable is expressed in categorical form (successful/unsuccessful), then bivariate analysis is performed using the Wilcoxon test, in accordance with the research design and data distribution. A p-value < 0.05 is set as the statistical significance threshold.

The entire research process was carried out in accordance with the principles of health research ethics. Mothers in labor were given an explanation of the purpose, benefits, and procedures of the research and were asked to provide written informed consent. The confidentiality of respondents' identities was maintained, and all data obtained was used solely for research purposes.

With this research method, it is hoped that scientific evidence can be obtained regarding the effect of auditory stimulation on the success of IMD at the North Minahasa Medical Center Hospital, so that the results of the study can be used as a basis for developing simple, safe, and easy-to-apply non-pharmacological interventions to support the success of IMD in health care facilities.

3. RESULTS AND DISCUSSION

Table 1. Demographic data.

Var		n	F (%)
Age	< 20 years old	1	3.3
	20-35 years old	24	80.0
	>35 years old	5	16.7
Education	Elementary school	0	0
	Junior high school	1	3.3
	High School	14	46.7
	College/university	15	50.0
Employment	Housewife	15	50
	Farmer	4	13.3
	Private employee	10	33.3
	Government employee	1	3.3
Parity	0	12	40.0
	1	12	40.0
	2	6	20.0

Knowledge before	Poor	6	20.0
	Moderate	23	76.6
	Good	1	3.3
Knowledge after	Poor	0	0
	Moderate	10	33.3
	Good	20	66.7
Total		30	100

(source: primary data, 2025)

This study involved 30 respondents who were mothers giving birth at the Sentra Medika Minahasa Utara Hospital. The characteristics of the respondents were presented based on age, education level, occupation, parity, and level of knowledge before and after the intervention.

Based on age group, most respondents were in the 20–35 age range, namely 24 people (80.0%), which is the ideal reproductive age. Respondents aged >35 years numbered 5 (16.7%), while respondents aged <20 years numbered only 1 (3.3%). This distribution shows that the majority of mothers giving birth are at an age that biologically supports the process of childbirth and breastfeeding.

In terms of education level, almost half of the respondents had a college education, namely 15 people (50.0%), followed by 14 people (46.7%) with a high school education. Only 1 respondent (3.3%) had a junior high school education, and there were no respondents with an elementary school education. The high level of education among respondents indicates a good potential for understanding health information, including education related to IMD and auditory stimulation.

Based on employment status, half of the respondents were housewives, totaling 15 people (50.0%). Respondents who worked as private employees numbered 10 (33.3%), farmers numbered 4 (13.3%), and civil servants numbered 1 (3.3%). This variation in employment reflects diverse socioeconomic backgrounds, which may influence mothers' experiences and perceptions of the childbirth and breastfeeding processes.

The parity characteristics show that there were 12 respondents with parity 0 and parity 1 (40.0%), while there were 6 respondents with parity 2 (20.0%). There were no respondents with parity ≥3. This indicates that most mothers were in their first pregnancy and childbirth experience, which could potentially affect their readiness and response to interventions during the IMD process.

In addition, the distribution of respondents' knowledge levels prior to the intervention showed that most were in the moderate knowledge category, namely 23 people (76.6%), followed by 6 people (20.0%) in the poor knowledge category, and only 1 person (3.3%) with good knowledge. After the intervention, there was a clear change, with no respondents remaining in the low knowledge category. Some respondents remained in the moderate

knowledge category, numbering 10 people (33.3%), while the majority improved to the good knowledge category, numbering 20 people (66.7%).

Overall, the characteristics of the respondents show that mothers giving birth at Sentra Medika Minahasa Utara Hospital are predominantly of ideal reproductive age, have a high school education or higher, and have low parity. This profile is important to consider in interpreting the research results, particularly in assessing the effect of auditory stimulation on the success of IMD.

Table 2. Statistical Analysis.

Independent variable	N	P Value	Dependent variable
Knowledge before	30	0.000	Knowledge after
		Wilcoxon	

*significan

(source: primary data, 2025)

To determine the effect of the intervention on respondents' knowledge levels, an analysis was conducted to compare knowledge levels before and after the intervention. Based on the results of the normality test, the knowledge level data did not meet the assumption of normal distribution, so a bivariate analysis was conducted using the Wilcoxon signed-rank test, which is a non-parametric test for comparing two paired measurements.

The Wilcoxon test results show a p-value of 0.000 ($p < 0.05$). This value indicates that there is a statistically significant difference between the level of knowledge before and after the intervention. Thus, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted, which means that the intervention provided had a significant effect on increasing the respondents' level of knowledge.

Descriptively, these results are in line with changes in the distribution of respondents' knowledge levels, where before the intervention most respondents were in the low and moderate knowledge categories, while after the intervention the majority of respondents were in the good knowledge category. These findings indicate that the intervention was effective in improving respondents' understanding of the material presented.

Discussion

The results of this study indicate that the intervention provided had a significant effect on increasing respondents' knowledge, as evidenced by the Wilcoxon test results with a p-value of 0.000. This finding indicates that the intervention was effective in improving respondents' understanding of the material provided, which in the context of this study was related to factors supporting the success of Early Breastfeeding Initiation (EBI). This increase in knowledge is

an important prerequisite for changes in attitudes and practices that support the success of EBI in health care facilities.

Increased knowledge after intervention can be understood through the adult learning process, in which individuals more easily absorb information that is relevant to their direct experiences and actual needs. Mothers who have given birth are at a stage in their lives that is highly sensitive to information about infant health and breastfeeding, so timely intervention tends to have a greater cognitive impact. Research by Sharma et al. (2018) shows that education provided during the perinatal period significantly improves mothers' readiness to undergo the breastfeeding process, including understanding of IMD.

The results of this study are in line with previous studies that emphasize the importance of educational and supportive interventions in improving the success of early breastfeeding practices. Research by Esteves et al. (2015) reports that support and stimulation provided immediately after childbirth can increase the readiness of mothers and babies to start breastfeeding effectively. Another study by Moore et al. (2016) also confirmed that early intervention in the first hour of life has a positive impact on the breastfeeding process, especially when done consistently and without interruption.

From a clinical theory perspective, the success of IMD is influenced by complex interactions between physiological, psychological, and environmental factors. Skin-to-skin contact and adequate sensory stimulation help activate the baby's innate reflexes, including the rooting reflex and sucking reflex, which are important for effective breastfeeding. Sensory stimulation, including soothing auditory stimuli, can help stabilize the infant's behavior and reduce stress during the postnatal transition period (Als et al., 2017). Infants who are calmer and more organized neurobehaviorally will find it easier to latch on and suckle effectively.

In addition to affecting the baby, supportive interventions also influence the mother's psychological condition. Maternal stress and anxiety are known to inhibit the oxytocin reflex, which plays an important role in milk production. Research by Uvnäs-Moberg et al. (2020) shows that a supportive and calming environment in the early postpartum period can increase oxytocin release, thereby supporting the breastfeeding process. With increased knowledge and confidence in mothers, the physiological response that supports IMD becomes more optimal.

Although the results of this study show a significant increase in knowledge, not all respondents achieved the same level of knowledge after the intervention. Some respondents still remained in the moderate knowledge category. These findings indicate that knowledge improvement does not always occur evenly among individuals. Factors such as education level, previous childbirth experience, postpartum fatigue, and the mother's ability to concentrate can

affect information absorption. Research by Kronborg et al. (2016) states that previous breastfeeding experience and social support play an important role in influencing mothers' readiness to receive information and apply it in breastfeeding practices.

In addition, time constraints and clinical conditions in the delivery room can also affect the effectiveness of interventions. In hospital practice, the main focus is often on stabilizing the mother and baby, so educational or supportive interventions may be fragmented. This is in line with the findings of Rollins et al. (2016), who highlight that although the benefits of IMD are widely recognized, its implementation in health facilities still faces various structural and systemic challenges.

The clinical implications of this study are quite important for obstetric and neonatal services in hospitals. Increasing mothers' knowledge is a crucial first step in supporting the success of IMD. Health workers, especially midwives and maternity nurses, can use the results of this study as a basis for strengthening educational and supportive interventions during the intrapartum period and immediately after delivery. Simple, non-invasive interventions that are easily integrated into the service flow, such as calming sensory approaches, have the potential to improve the quality of the birth experience and early breastfeeding.

Furthermore, the results of this study support the need to strengthen baby- and mother-friendly hospital policies, including training health workers on the importance of an environment that supports IMD. Consistent education and intervention can help bridge the gap between policy recommendations and everyday clinical practice. Further research is recommended to evaluate the impact of this increased knowledge on more specific clinical outcomes, such as duration of IMD, successful attachment, and sustainability of exclusive breastfeeding.

Overall, this study shows that the intervention provided was effective in increasing respondents' knowledge and has the potential to support the success of IMD. However, a more comprehensive and sustainable approach is still needed to ensure that increased knowledge can be translated into optimal and consistent clinical practice.

4. CONCLUSION

This study concluded that the intervention had a significant effect on increasing respondents' knowledge, which played an important role in supporting the success of Early Breastfeeding Initiation (IMD) at Sentra Medika Minahasa Hospital in North Minahasa. Statistical analysis results show a significant difference between the level of knowledge before and after the intervention, indicating that the approach used is effective in improving mothers'

understanding of factors supporting EBI. This increase in knowledge is expected to strengthen mothers' readiness to undergo the EBI process, support optimal physiological responses, and encourage better early breastfeeding practices. Thus, auditory stimulation as part of supportive intervention has the potential to be a simple, safe, and applicable non-pharmacological strategy to improve the quality of midwifery and neonatal care in hospitals.

Acknowledgement

The author would like to express his deepest gratitude to the Director of Sentra Medika Minahasa Utara Hospital and all health workers, especially midwives and nurses in the delivery room, who have provided support and opportunities in conducting this research. Thanks are also extended to all the mothers who were willing to be respondents and actively participated in the research. The highest appreciation is given to the educational institution, the supervising lecturer, and all parties who provided guidance, direction, and moral and technical support so that this research could be completed successfully.

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