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Effectiveness of VIO-ASI (oxytocin massage animation video) on maternal and paternal breastfeeding self-efficacy: A quasi-experimental study

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ABSTRACT

Background: *Exclusive breastfeeding remains a major public health priority, yet mothers who deliver by caesarean section often face early physiological and psychological barriers that may reduce breastfeeding confidence and limit effective family support.*
Objectives: *This study evaluated the effectiveness of VIO-ASI, an oxytocin massage animation video, in improving maternal breastfeeding self-efficacy and paternal self-efficacy in supporting breastfeeding among post-caesarean families.*
Methods: *A quasi-experimental pretest-posttest study with a control group was conducted in a general hospital in Central Java, Indonesia, from December 2025 to February 2026. The final sample comprised 32 mother-father pairs, including 17 in the intervention group and 15 in the control group. The intervention group received animated video on oxytocin massage, whereas the control group received standard hospital care. Maternal breastfeeding self-efficacy and paternal self-efficacy were measured at baseline and one week later using validated Indonesian instruments.*
Results: *The intervention did not produce a statistically significant increase in self-efficacy among either mothers or fathers within one week. Maternal baseline self-efficacy was significantly lower in the intervention group than in the control group (56.29 ± 9.83 vs 63.47 ± 5.71; p=0.021). At follow-up, maternal scores remained lower in the intervention group, but the difference was no longer significant (56.41 ± 10.47 vs 60.93 ± 7.80; p=0.181). Within-group changes were not significant in either mothers (p=0.924 intervention; p=0.116 control) or fathers. For fathers, baseline scores were 58.24 ± 8.00 versus 61.07 ± 9.12 (p=0.272), and follow-up scores were 59.41 ± 8.47 versus 61.60 ± 7.63 (p=0.594), with no significant difference in change scores (p=0.815).*
Conclusion: *animated breastfeeding education may be more useful as a supportive component within a broader postpartum lactation intervention than as an isolated educational tool. The findings highlight the importance of integrating digital education with counselling, demonstration, family participation, and postpartum follow-up.*

KEYWORD: *animated video; breastfeeding self-efficacy; caesarean section; exclusive breastfeeding; oxytocin massage*

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INTRODUCTION

Exclusive breastfeeding during the first six months of life remains the standard recommended by the World Health Organization and UNICEF because it reduces infant morbidity and mortality and provides sustained benefits for both mother and child (1). Recent evidence continues to frame exclusive breastfeeding as a major public health intervention for improving child survival, reducing infection, and supporting early development (2,3). However, breastfeeding initiation and continuation remain uneven across countries and health systems. Fewer than half of newborns in many settings are breastfed within the first hour of life, and only about 48% of infants aged 0–6 months are exclusively breastfed, indicating a persistent gap between policy and practice (3). These disparities are influenced not only by maternal and infant factors, but also by institutional routines, family support, workplace conditions, and the quality of lactation care after birth (2,4).

Indonesia reflects this pattern of progress alongside continuing vulnerability. National coverage of exclusive breastfeeding among infants under six months increased from 52% in 2017 to 66.4% in 2024, but a substantial proportion of infants still do not receive exclusive breastfeeding for the recommended duration (5). Similar improvements have been reported in Central Java, where coverage reached 71.9% in 2024 compared with 64.3% in 2023 and in Semarang Regency, where it rose from 61.8% in 2023 to 76.2% in 2024 (6,7). Nevertheless, higher coverage does not remove structural and clinical barriers. Evidence from several settings shows that breastfeeding initiation and continuation remain highly sensitive to education, access to care, delivery conditions, and early postpartum support (3,4,8). Exclusive breastfeeding therefore remains a fragile outcome, particularly among women facing more complex postpartum challenges.

One of the groups most vulnerable to breastfeeding difficulty is mothers who deliver by caesarean section. Recent studies show that caesarean birth is associated with delayed breastfeeding initiation, delayed lactogenesis, lower exclusive breastfeeding rates, and shorter breastfeeding duration compared with vaginal birth (3,8,9,10). Delayed onset of lactation is especially important because it may reduce milk production and increase the risk of early cessation of exclusive

breastfeeding. In post-caesarean mothers, these challenges are not purely physiological. Pain, fatigue, limited mobility, anxiety, and temporary mother–infant separation may interfere with early feeding attempts, milk transfer, and confidence in breastfeeding (10,11). Although hospital support and breastfeeding friendly routines may mitigate these risks, caesarean birth remains a major obstacle when timely lactation support is inadequate (3,4).

Within this context, breastfeeding self-efficacy has emerged as a central psychosocial determinant. It refers to a mother's confidence in her ability to breastfeed successfully and has been consistently associated with breastfeeding initiation, persistence, and exclusivity. Recent psychometric and empirical evidence shows that stronger self-efficacy is linked to better breastfeeding outcomes, whereas lower self-efficacy is more common among mothers who experience early breastfeeding difficulty, emotional distress, or inadequate support (3,11,12). Conversely, prior experience, adequate knowledge, positive feeding experiences, and supportive environments tend to strengthen confidence and improve outcomes (12). This makes self-efficacy an important target for intervention.

Among non-pharmacological strategies to support lactation, oxytocin related interventions are especially relevant because oxytocin plays a central role in the milk ejection reflex. Oxytocin massage, commonly performed along the spine to the ribs, has been proposed as a practical method for stimulating oxytocin release and supporting milk flow. More broadly, recent evidence shows that non-pharmacological lactation support such as early essential neonatal care, skin to skin contact, and breast stimulation can accelerate lactogenesis and improve breastfeeding outcomes after caesarean birth (13,14). These findings suggest that breastfeeding difficulties after caesarean delivery are modifiable conditions that may respond to timely support.

The effectiveness of such interventions, however, depends not only on physiological relevance but also on how well mothers and families understand and apply them. Oxytocin massage is procedural and may be difficult to teach through verbal explanation alone. For this reason, digital and video based education has become increasingly important in postpartum care. Video assisted education offers clear, repeatable, and consistent demonstration of technique, and prior research shows that structured breastfeeding education delivered through digital formats can improve self-efficacy and family support, especially when fathers are engaged (15,16). Partner support is particularly important in the post caesarean context because husbands may influence maternal confidence through emotional encouragement, practical assistance, and participation in breastfeeding related care.

Recent evidence suggests that paternal support is associated with improved breastfeeding continuation and a stronger breastfeeding support environment within the family (15,17).

Despite the recognized value of lactation support interventions, digital education, and partner involvement, an important gap remains. Research specifically examining animation-based education for teaching oxytocin massage to both post caesarean mothers and their husbands remains limited. Most previous studies have focused on general breastfeeding education or on interventions targeted separately to mothers or fathers, rather than on an integrated family centered approach using animation as the instructional medium. Therefore, this study introduces VIO-ASI as an animation-based educational intervention that combines post caesarean breastfeeding support, oxytocin massage instruction, and active husband involvement to improve maternal breastfeeding self-efficacy and husbands' self-efficacy in supporting breastfeeding.

MATERIALS AND METHODS

This study used a quasi-experimental pretest-posttest design with a control group to evaluate the effectiveness of VIO-ASI on maternal and paternal breastfeeding self-efficacy among post caesarean families. The design enabled comparison of changes in breastfeeding self-efficacy over time between an intervention group receiving education through an oxytocin massage animation video and a control group receiving standard hospital care. Because breastfeeding self-efficacy may change rapidly during the early postpartum period in response to experience, information, and support, the pretest-posttest format was essential. The inclusion of a control group improved interpretability, although baseline non-equivalence remained a potential limitation, as is typical in non-randomized research.

Data were collected from December 2025 to February 2026 at a general hospital in Central Java, Indonesia. The hospital setting was relevant because it allowed recruitment of mothers during the immediate post caesarean period, when breastfeeding difficulties, delayed initiation, and low confidence are most likely to emerge. The intervention could therefore be delivered within 24-72 hours after surgery, a clinically important period for lactation support.

The target population consisted of mothers who had undergone caesarean section at the study site, where approximately 21 eligible cases occurred per month. Because the intervention was designed to address both maternal breastfeeding confidence and husbands' confidence in supporting breastfeeding, the unit of participation was the mother father pair. Purposive sampling was used to recruit participants who met the required clinical and logistical criteria. Sample size was

calculated using the formula for detecting a difference in means, resulting in a target of 17 couples per group. Thus, 17 couples were initially included in both the intervention and control groups. During follow up, two respondents in the control group dropped out, leaving a final sample of 32 couples: 17 in the intervention group and 15 in the control group.

Eligibility criteria were established to ensure clinical stability and feasibility of intervention participation. Inclusion criteria were: mothers aged more than 20 years; mothers with a baby of eligible gestational age for postpartum breastfeeding care; mothers in stable post-surgical condition; mothers with a live born infant not requiring Neonatal Intensive Care Unit care; mother and husband willing to participate; ability to communicate in Indonesian; and possession of a smartphone. These criteria ensured that participants could receive the intervention, complete the questionnaires, and participate in the one week follow up. The exclusion criterion was mother or baby requiring intensive care, including ICU or NICU admission, during the intervention period. This criterion was necessary because intensive care conditions could substantially affect breastfeeding opportunities, maternal recovery, paternal involvement, and intervention feasibility.

The primary outcomes were maternal breastfeeding self-efficacy and paternal breastfeeding self-efficacy. Maternal self-efficacy was measured using the Indonesian version of the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF), which consists of 14 items scored on a five point scale from 1 = not confident at all to 5 = very confident. Total scores range from 14 to 70, with higher scores indicating stronger self-efficacy. In the source used by this study, the BSES-SF demonstrated strong internal consistency (Cronbach's alpha = 0.91) and acceptable validity, with item correlations above the critical value of 0.196 (18). These properties are consistent with broader evidence supporting the reliability and cross cultural validity of the BSES-SF (12).

Paternal self-efficacy was assessed using the Indonesian version of the Paternal Breastfeeding Self-Efficacy Scale-Short Form, also comprising 14 items scored on a five-point scale. This instrument showed excellent internal consistency (Cronbach's alpha = 0.96), and confirmatory factor analysis supported construct validity with factor loadings ranging from 0.75 to 0.86 (19). Its use was methodologically justified because paternal self-efficacy has become an important construct in family centered breastfeeding research (12,20). In addition, respondent characteristics for both mothers and fathers were collected to describe the sample and assess baseline comparability.

The intervention consisted of VIO-ASI, a 2D animated oxytocin massage video in MP4 format with a duration of approximately 3 minutes and 56 seconds. The video provided visual and procedural instruction

on oxytocin massage as a non pharmacological strategy to support lactation. The use of animation was relevant because video-based interventions can improve health literacy, procedural understanding, and confidence when information must be delivered consistently and accessibly (15,21). The video was shown to mothers within 24-72 hours after caesarean section using a laptop or mobile device. During the initial session, it was played three times to reinforce comprehension, then sent through WhatsApp for later review at home. This delivery approach reflected key principles of digital perinatal education, including accessibility, repeatability, and family engagement (15,22,23). The control group received standard hospital care.

Data collection followed a structured sequence. Eligible couples were recruited, informed consent was obtained, and baseline characteristics were recorded. Pretest maternal and paternal breastfeeding self-efficacy scores were then collected before intervention delivery. One week later, the same measures were repeated in both groups, ensuring consistency in outcome timing. Data were analyzed using IBM SPSS version 26. Univariate analysis was used to summarize characteristics and outcomes through frequencies, percentages, means, and standard deviations. Normality was tested using the Shapiro-Wilk test. For baseline comparisons, chi-square tests were used for categorical variables, while independent-samples t-tests or Mann-Whitney tests were used for continuous variables depending on distribution. For outcome analysis, independent-samples t-tests and Mann-Whitney tests were used for between-group comparisons, whereas dependent-samples t-tests and Wilcoxon tests were used for within-group pretest-posttest comparisons. Statistical significance was set at $p<0.05$. This analytic strategy was appropriate for the study design and sample size, while still acknowledging that non randomized studies may be strengthened by adjustment for baseline imbalance or more advanced causal modeling when feasible (24,25). This study received ethical approval from the Ngudi Waluyo University Ethics Committee, No. 761/KEP/EC/UNW/2025, dated 20 November 2025.

Table 1. Characteristics of mothers

Characteristics	n (%)				*p-value*
	Intervention Group (n=17)		Control Group (n=15)		
Mother's age (years)	29.88	(6.39)	29.07	(7.32)	0.739[a]
Work					
Working	6	(35.3)	6	(40.0)	1,000[b]
Not in employment	11	(64.7)	9	(60.0)	

Level of Education					
Primary	5	(29.4)	7	(46.7)	0.142[c]
Secondary	7	(41.2)	7	(46.7)	
Higher	5	(29.4)	1	(6.7)	
Breastfeeding history					
Never	5	(29.4)	7	(46.6)	0.672[c]
Non-exclusive breastfeeding	3	(17.6)	0	(0.0)	
Exclusive breastfeeding	9	(52.9)	8	(53.3)	
Number of Children	1.94	(0.740)	1.87	(0.99)	0.630[c]
Parity					
Primiparous	5	(29.4)	7	(46.7)	0.522[b]
Multiparous	12	(70.6)	8	(53.3)	
Gestational age (weeks)					
< 37	3	(17.6)	2	(13.3)	0.956[c]
37–42	13	(76.5)	13	(86.7)	
> 42	1	(5.9)	0	(0.0)	
Indications for caesarean section					
Fetal distress	0	(0.0)	1	(6.7)	0.927[c]
SC History	7	(41.2)	4	(26.7)	
Pre-eclampsia	3	(20.0)	3	(20.0)	
Premature rupture of membranes	2	(13.3)	2	(13.3)	
Other	5	(33.3)	5	(33.3)	
Breastfeeding Frequency in the Last 24 Hours (times)					
< 8	2	(13.3)	2	(13.3)	0.016[c]
8–12	9	(60.0)	9	(60.0)	
> 12	4	(26.7)	4	(26.7)	
not yet breastfeeding	0	(0.0)	0	(0.0)	

Categorical variables are presented as n (%) and continuous variables as mean (SD)
[a] Independent-samples t-test
[b] Chi-square test
[c] Mann-Whitney test

RESULTS AND DISCUSSION

Respondent Characteristics

Table 1, a total of 32 mother father pairs were included in the final analysis, comprising 17 pairs in the intervention group and 15 in the control group after two respondents in the control group were lost during follow up. The final sample therefore represents participants who completed both baseline and one week follow up assessments, which is consistent with other short term breastfeeding intervention studies after caesarean birth (10,14).

Maternal baseline characteristics were generally comparable between groups, although not fully equivalent. The mean maternal age was 29.88 ± 6.39 years in the intervention group and 29.07 ± 7.32 years in the control group (p = 0.739). Employment status was also similar, with most mothers

in both groups not working (64.7% vs. 60.0%; p = 1.000). Educational level did not differ significantly (p = 0.142), and breastfeeding history was likewise comparable (p = 0.672). In the intervention group, 52.9% of mothers had previous exclusive breastfeeding experience, 17.6% had previous non exclusive breastfeeding experience, and 29.4% had no previous breastfeeding experience. In the control group, 53.3% had previous exclusive breastfeeding experience and 46.6% had no previous breastfeeding experience. The mean number of children (p = 0.630), parity (p = 0.522), gestational age (p = 0.956), and indications for caesarean section (p = 0.927) were also broadly similar. However, breastfeeding frequency in the previous 24 hours differed significantly between groups (p = 0.016). This is relevant because early breastfeeding frequency may reflect maternal adaptation, feeding opportunity, and early confidence, all of which may influence later breastfeeding outcomes in post caesarean settings (10,14). This study found that VIO-ASI did not produce a statistically significant short term improvement in breastfeeding self-efficacy among either mothers or fathers. The findings should be interpreted in relation to the pattern shown across all four tables rather than from the outcome tables alone. **Table 1** indicates that maternal baseline characteristics were generally comparable between groups, but breastfeeding frequency in the previous 24 hours differed significantly.

This difference is important because, in post caesarean mothers, early feeding frequency may reflect both opportunity to breastfeed and early adaptation to breastfeeding. Mothers recovering from caesarean birth often face pain, delayed lactogenesis, and restricted mobility, all of which may affect feeding frequency and later breastfeeding confidence (10,11,14). Thus, although the two groups were similar in most demographic and obstetric variables, the difference in early breastfeeding frequency suggests that maternal breastfeeding conditions were not entirely identical at baseline.

Table 2. Characteristics of fathers

Characteristics	n (%)				*p-value*
	Intervention Group (n=17)		Control Group (n=15)		
Father's age (years)	31.88	(6.95)	30.53	(6.26)	0.570[a]
Occupation					
Working	17	(100.0)	14	(93.3)	0.494[b]
Not working	0	(0.0)	1	(6.7)	
Level of education					
Primary	4	(23.5)	6	(40.0)	0.174[c]
Secondary	9	(52.9)	8	(53.3)	
Higher	4	(23.5)	1	(6.7)	

Experience Supporting Wife During Breastfeeding					
No	7	(41.2)	9	(60.0)	0.479[b]
Yes	10	(58.8)	6	(40.0)	
Time Availability					
Limited	3	(17.6)	0	(0.0)	0.144[c]
Sufficiently available	4	(23.5)	3	(20.0)	
Highly available	10	(58.8)	12	(80.0)	

Categorical variables are presented as n (%) and continuous variables as mean (SD)
[a] Independent-samples t-test
[b] Chi-square test
[c]Mann-Whitney test

The paternal baseline profile was more balanced. Fathers' mean age was 31.88 ± 6.95 years in the intervention group and 30.53 ± 6.26 years in the control group (p = 0.570). Most fathers were employed, with all fathers in the intervention group and 93.3% in the control group reporting employment (p = 0.494). Educational level did not differ significantly (p = 0.174), and most fathers in both groups had secondary education.

Previous experience supporting a wife during breastfeeding was reported by 58.8% of fathers in the intervention group and 40.0% in the control group, but this difference was not significant (p = 0.479). Time availability for breastfeeding support also showed no significant difference (p = 0.144). Overall, these findings suggest that fathers in both groups entered the study with relatively similar demographic and support related characteristics.

Table 2 shows that fathers in the intervention and control groups were broadly comparable in age, education, employment, previous support experience, and time availability. This relatively balanced paternal profile is important because it reduces concern that later paternal outcomes were primarily driven by strong baseline demographic differences. At the same time, the descriptive data suggest that many fathers already had some degree of availability and prior experience in supporting breastfeeding. This may have limited the room for large short term changes in paternal self-efficacy after a brief educational exposure. Recent literature suggests that father-inclusive breastfeeding interventions tend to produce stronger effects when they are interactive, repeated, and specifically designed to strengthen paternal confidence and supportive behaviour over time (15,26).

Table 3. Comparison of the mean BSES-SF (Breastfeeding Self-Efficacy Scale-Short Form) scores between and within groups

BSES-SF scores	Intervention group (n=17)	Control group (n=15)	Between-groups *p-value*
Pre-test	56.29 (9.83)	63.47 (5.71)	0.021[a]
Post-test	56.41 (10.47)	60.93 (7.80)	0.181[b]
Within-group p-value	0.924[c]	0.116[d]	
Difference	-0.12 (5.00)	2.53 (5.94)	0.180[a]

Data are presented as mean (SD)
[a] Mann-Whitney test
[b] Independent-samples t-test
[c] Paired t-test
[d] Wilcoxon test

Mothers' BSES-SF Scores

Maternal breastfeeding self-efficacy was assessed using the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF). At baseline, the intervention group had significantly lower scores than the control group (56.29 ± 9.83 vs. 63.47 ± 5.71; p = 0.021), indicating that maternal self-efficacy was not equivalent before intervention. At one week after the intervention, maternal scores remained lower in the intervention group than in the control group (56.41 ± 10.47 vs. 60.93 ± 7.80), but this difference was no longer statistically significant (p = 0.181).

Within group analysis showed no significant change over time in either group. In the intervention group, scores were essentially unchanged (p = 0.924). In the control group, scores declined slightly, but not significantly (p = 0.116). Comparison of change scores between groups was also not significant (p = 0.180), with a mean difference of -0.12 ± 5.00 in the intervention group and 2.53 ± 5.94 in the control group. These findings indicate that VIO-ASI did not produce a statistically significant short-term increase in maternal breastfeeding self-efficacy. This pattern is important because maternal confidence after caesarean birth may be shaped by postoperative discomfort, delayed milk flow, and early feeding experience, which may limit the effect of a brief educational intervention (12,14).

The central maternal finding is presented in **Table 3**. Mothers in the intervention group had significantly lower baseline Breastfeeding Self-Efficacy Scale-Short Form scores than those in the control group. This means that maternal self-efficacy was not fully equivalent before the intervention, which is a critical issue in interpreting the effect of VIO-ASI. In quasi-experimental studies, baseline non equivalence limits the certainty with which later outcomes can be attributed to the intervention. The absence of a significant post intervention difference, therefore, should not be interpreted as definitive evidence that the intervention had no value, but rather that no statistically detectable

effect was observed under the conditions of this study. At follow up, maternal scores in the intervention group remained lower than those in the control group, but the difference was no longer statistically significant, and no significant within group changes were found. These results suggest that a brief animation based intervention was insufficient to produce measurable improvement in maternal breastfeeding confidence within one week.

This pattern is consistent with current evidence indicating that breastfeeding self-efficacy is a multidimensional construct influenced not only by information, but also by prior experience, emotional state, early feeding success, and the quality of postpartum support (12). In mothers following caesarean section, these influences may be especially strong because postoperative pain, delayed milk flow, anxiety, and fatigue can limit the effect of education delivered in isolation (11,14). Although video based education offers practical advantages, stronger outcomes are more often reported when such approaches are embedded within broader support strategies that include demonstration, counselling, and repeated reinforcement (14,15).

A major explanation for the non significant maternal effect lies in the limited intensity of the intervention. VIO-ASI was delivered as a brief, single component animated educational video of less than four minutes, and outcomes were reassessed after only one week. Breastfeeding self-efficacy, however, is not shaped by information alone. It develops through mastery experiences, emotional regulation, social persuasion, and repeated success in actual breastfeeding situations (12). Consequently, a short educational exposure may improve awareness or procedural understanding without necessarily transforming a mother's confidence in her ability to breastfeed under difficult post caesarean conditions.

This interpretation is consistent with previous evidence showing that stronger improvements in maternal breastfeeding outcomes are more likely when interventions are repeated, multi component, and supported by direct care. Reviews of postpartum interventions suggest that the most effective strategies combine education with counselling, reinforcement, and sustained support during the postpartum period (14,27). Similarly, supportive postpartum care has been shown to reduce maternal anxiety, which is relevant because anxiety and distress may interfere with breastfeeding confidence and responsiveness to intervention (28). In mothers recovering from surgery, unresolved pain may also limit breastfeeding effectiveness and reduce the impact of educational input (29).

Table 4. Comparison of the mean Paternal BSES-SF scores between and within groups

Paternal BSES-SF score	Intervention group (n=17)	Control group (n=15)	Between-groups *p-value*
Pre-test	58.24 (8.00)	61.07 (9.12)	0.272[a]
Post-test	59.41 (8.47)	61.60 (7.63)	0.594[a]
Within-group p-value	0.553 [c]	0.894 [d]	
Difference	-1.18 (0.01)	-0.53 (7.31)	0.815 [b]

Paternal BSES-SF Scores

Paternal breastfeeding self-efficacy was measured using the Paternal BSES-SF. Unlike maternal outcomes, paternal scores did not differ significantly at baseline (58.24 ± 8.00 vs. 61.07 ± 9.12; p = 0.272), indicating greater baseline equivalence. At follow up, the mean posttest score was 59.41 ± 8.47 in the intervention group and 61.60 ± 7.63 in the control group, and this difference remained non significant (p = 0.594). Within group analysis also showed no significant change in either group, with p = 0.553 in the intervention group and p = 0.894 in the control group. The difference in change scores between groups was likewise not significant (p = 0.815). These results indicate that VIO-ASI did not significantly improve paternal breastfeeding self-efficacy within one week. Although father focused interventions may strengthen paternal confidence, previous evidence suggests that stronger effects usually require repeated, interactive, and more explicitly targeted support (15,26,30).

Table 4 presents paternal breastfeeding self-efficacy outcomes. Unlike the maternal results, paternal self-efficacy did not differ significantly between groups at baseline, suggesting better initial equivalence. However, no significant improvement was found at follow up, and the difference in change scores was also not significant.

This finding suggests that VIO-ASI did not substantially strengthen fathers' confidence in supporting breastfeeding within the one week follow up period. This result is still meaningful because paternal support is widely recognized as an important contributor to breastfeeding success, particularly during the early postpartum phase. Fathers may influence breastfeeding through practical help, emotional reassurance, and a more supportive home environment. However, previous studies indicate that paternal confidence is more likely to improve when fathers receive targeted, participatory, and practice-oriented support rather than passive exposure to information alone (15,26).

A possible explanation is that the intervention for fathers was brief, indirect, and not supported by structured practice or feedback. Thus, fathers may have

understood the content without developing stronger confidence or supportive behaviour within the short follow up period. Paternal breastfeeding self-efficacy may also be influenced by prior caregiving experience, role clarity, and direct involvement in postpartum care, which were not fully controlled in this study (30,31). To reduce potential bias, baseline paternal characteristics were compared and showed no significant differences between groups. The same validated instrument was used at pretest and posttest, and both groups were assessed at the same follow up interval. However, because adherence was not measured, including repeated viewing of the video or actual practice of oxytocin massage, the findings should be interpreted with caution. Future studies should include stronger father centered components, adherence monitoring, and adjustment for possible confounders (12,15,31).

Overall, the evidence from the four tables suggest that the lack of significant intervention effect is best understood as the result of several interacting factors. First, maternal baseline non equivalence, particularly in self-efficacy and early feeding frequency, reduced the clarity of post intervention comparison. Second, both mothers and fathers may already have had relatively stable baseline beliefs because many mothers were multiparous and many fathers had prior support experience. Third, the intervention itself was brief and single component, whereas current evidence supports more interactive and repeated approaches for improving breastfeeding self-efficacy in both mothers and fathers (12,14,15,26).

This study has several limitations that should be considered. First, the sample size was small, with 17 mothers in the intervention group and 15 in the control group, which may have limited statistical power and contributed to the non significant findings. Second, maternal baseline non equivalence, particularly in breastfeeding self-efficacy and breastfeeding frequency, reduced the strength of causal interpretation. Third, the intervention was brief and evaluated over only one week, which may have been insufficient to capture changes in confidence that develop gradually through repeated experience and support.

Even so, these findings do not suggest that VIO-ASI lacks practical relevance. Rather, they indicate that animation based education may function more effectively as a supportive component within a broader postpartum lactation intervention than as a stand alone strategy. This interpretation is consistent with self-efficacy theory, which holds that confidence is strengthened not by information alone, but by mastery experiences, verbal encouragement, emotional regulation, and opportunities to apply knowledge in practice. From this perspective, a short animation can improve procedural understanding, but it may be insufficient to

change breastfeeding self-efficacy if mothers and fathers do not also receive interpersonal support, feedback, and opportunities to practise breastfeeding related skills (32).

This perspective is also supported by coparenting and social support frameworks. Breastfeeding is not solely an individual maternal behavior; it is shaped by the quality of support within the family and the postpartum care environment. Reviews of coparenting interventions show that father involvement, shared decision making, and coordinated parental support are associated with stronger breastfeeding outcomes than mother focused education alone (30,31). In this context, VIO-ASI may help fathers understand oxytocin massage and their supportive role, but its effect is likely to remain limited if it is not embedded in a wider process that actively involves fathers in practice, communication, and emotional support.

A broader ecological perspective further explains the findings. Breastfeeding outcomes are shaped not only by maternal knowledge, but also by interactions across individual, interpersonal, organizational, and health service levels. Digital education can improve access to information and standardize instructional content, but stronger and more durable effects are seen when it is integrated with professional lactation support, repeated follow up, and care pathways responsive to postpartum needs (21,33). In this context, educational media are most effective when they operate within a supportive structure rather than in isolation.

Accordingly, the four tables collectively suggest that VIO-ASI was not sufficient to generate statistically significant short term improvement in maternal or paternal breastfeeding self-efficacy when delivered as a brief, stand alone intervention. However, this should not be interpreted as evidence that animation based education is ineffective. Rather, its practical value appears to lie in its integration into a multi component postpartum lactation package that combines digital instruction with active professional support, repeated contact, and stronger father involvement (21,30,31,32).

CONCLUSION AND RECOMMENDATION

This study concludes that VIO-ASI, an oxytocin massage animation video, did not demonstrate a statistically significant short term effect on maternal or paternal breastfeeding self-efficacy among families following caesarean birth. Within one week after the intervention, neither mothers nor fathers showed a significant increase in self-efficacy scores compared with the control group. These findings suggest that a brief, stand alone animation based educational intervention is not sufficiently robust to produce measurable psychological change during the early post caesarean period, when breastfeeding confidence is influenced by physical recovery, emotional

adjustment, prior experience, and family support. At the same time, the study offers a more meaningful contribution than a simple null result. The lower baseline maternal self-efficacy observed in the intervention group indicates that the findings should be interpreted cautiously, particularly given the quasi-experimental design. Rather than demonstrating that the intervention lacks value, the results indicate that it did not generate a statistically detectable improvement under the conditions tested.

The study contributes to breastfeeding research by focusing on post caesarean mothers and their husbands, evaluating an animated oxytocin massage education tool, and including paternal self-efficacy as an outcome. Its main implication is that digital educational media may be more effective when embedded within broader, family centered, and professionally supported interventions. Future studies should use larger samples, longer follow up periods, and stronger adjustment for baseline differences, while also examining intervention adherence and more interactive models of father inclusive breastfeeding support.

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