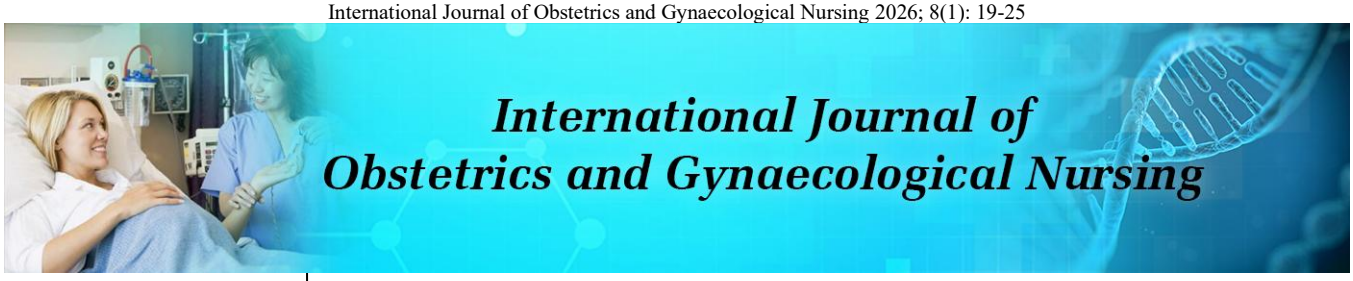

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An evaluative study: Effect of reflex zone therapy on the improvement of lactation among postnatal mothers, Odisha

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Abstract
Background: Breastfeeding is essential for the health and survival of newborns, yet many postnatal mothers experience difficulties in initiating and maintaining adequate lactation due to physical, psychological, and hormonal factors. Reflex zone therapy is a complementary, non-pharmacological intervention that may promote relaxation and stimulate hormonal responses essential for lactation. The present study aimed to assess the effectiveness of reflex zone therapy on improvement of lactation among postnatal mothers in SCB MCH, Cuttack, Odisha.
Methods: A quantitative pre-experimental research approach with one-group pre-test post-test design was adopted. The study was conducted among 40 postnatal mothers selected through non-probability purposive sampling technique. The level of lactation was assessed using the LATCH Breastfeeding Assessment Scale. Reflex zone therapy was administered to the mothers, and post-test assessment was carried out after the intervention. Data were analyzed using descriptive and inferential statistics, including paired t-test and chi-square test.
Results: The findings revealed a significant improvement in lactation scores after the administration of reflex zone therapy, indicating its effectiveness. The calculated t value was statistically significant at the 0.05 level. There was no significant association between post-test lactation scores and selected demographic variables except gravida.
Conclusion: The study concluded that reflex zone therapy is an effective, safe, and simple complementary intervention to improve lactation among postnatal mothers. It can be incorporated into routine postnatal nursing care to promote successful breastfeeding.

Keywords: Reflex zone therapy, lactation, postnatal mothers, breastfeeding, LATCH scale

Introduction
Motherhood is a distinct bio-psychosocial process that transforms and broadens the role of a woman into that of a mother. Childbirth is process beautifully designed by nature and the care following the birth of the baby also essential for the maintenance of health of both mother and child. Puerperium is a period, where the experiences are intense physical and emotional stress due to exhaustion, anxiety and excitement. Each mother has to adjust the physical changes in her own body due to involution and lactation. The main vital consideration for the infants in tropical countries are breast feeding and avoidance of infection [1].

Breast feeding is a natural human activity. To have the full benefit of breastfeeding, the WHO recommended exclusive breastfeeding for at least six months of life and supplemented breastfeeding for at least one year. In 2007, the rate of breastfeeding at early postpartum was 75.0% at 6 monthsofagewas43.0%andat12 months was 22.2% apparently, more than 50% of mother failed to breastfeed their baby adequately and thus face a risk of lactation failure due to stress, fatigue, anxiety, unfounded fears and also anesthesia, strong sedation, prolong labor, surgical intervention, placenta retention etc [2].

A study was conducted to determine factors affecting the onset time of lactation in vaginal and caesarean section deliveries with and without labour pain (elective). In this study300 parturient mothers selected and were divided in three separate groups (each consisted of 100 cases) according to their delivery type [vaginal and caesarean section with and without pain (elective)), the needed information about filling of breasts and milk ejection was given to

mothers before parturition, then a questionnaire was provided and offered to them, data collected and statistical analysis carried out. The result revealed that any kind of stress including caesarean section may postpone milk ejection by hormonal inhibition for a few days after delivery. So, to support breast feeding in our country, the rate of caesarean section must be diminished and vaginal delivery encouraged [3].

A study utilizing data from the WHO Global Survey on Maternal and Perinatal Health examined the factors that hinder early initiation of breastfeeding (EIBF). The study assessed the coverage of EIBF across 373 health facilities, focusing on singleton neonates for whom breastfeeding was initiated after birth. Maternal and institutional characteristics associated with EIBF were compared with those related to initiation of breastfeeding more than one hour after birth, using multiple logistic regression analysis. A total of 244,569 singleton live births without severe adverse outcomes were included in the analysis. The prevalence of EIBF showed marked variation between countries, ranging from 17.7% to 98.4%, with an overall average of 57.6%. In contrast, initiation of breastfeeding within 24 hours of birth demonstrated less variation within countries. After adjusting for confounding variables, EIBF was found to be significantly lower among women who experienced complications during pregnancy. Overall, the findings indicate substantial global differences in EIBF practices. Factors such as maternal pregnancy complications, caesarean section deliveries, and the lack of postnatal or neonatal care guidelines in health facilities were identified as barriers to timely breastfeeding initiation. The study highlights the need for targeted breastfeeding support, particularly for women with pregnancy-related complications and those experiencing lactation difficulties [4].

A descriptive study was carried out to determine the prevalence of lactation failure among postnatal mothers. The study included 519 mothers who attended the clinic. Data analysis showed that during the first clinic visit, 65.9% of mothers had already initiated supplementary feeding, with the most frequently reported reason being the mother's perception of insufficient breast milk, reported by 73.6% of participants. Clinical assessment indicated that 86.5% of mothers and 54.5% of infants had no associated complications. Local breast-related problems were identified in 19.3% of mothers, and improper breastfeeding positioning was observed in 47.2% of cases. The study concluded that psychological reassurance and support for mothers played a crucial role in the management of lactation failure [5].

A study was undertaken to examine the impact of elective primary and elective repeat caesarean section deliveries on lactation outcomes. Deliveries were categorized into vaginal births, elective caesarean sections (primary and repeat), and emergency caesarean sections. Out of the total births studied, 2,296 infants (24.7%) were delivered by caesarean section, of which 816 (35.5%) were primary elective caesarean deliveries and 796 (34.7%) were elective repeat caesarean deliveries. Additionally, 30.2% of elective caesarean sections were performed before 39 weeks of gestation. The use of infant formula feeding was reported by 6.9% of mothers who had vaginal deliveries, 8.3% of mothers who underwent emergency caesarean sections, 18.6% of mothers with elective caesarean deliveries, 23.3% of mothers with primary elective caesarean sections, and 13.9% of mothers with repeat elective caesarean sections. The study concluded that elective caesarean delivery, particularly primary procedures scheduled before 39 weeks of gestation, is associated with an increased risk of breastfeeding failure [6].

A comparative study was carried out to identify the factors contributing to breastfeeding failure among postpartum women admitted to the postnatal gynaecology ward of a Military Hospital in Rawalpindi. The study included 50 postnatal mothers, who were divided into two equal groups of 25 participants each. Group I consisted of mothers who were not breastfeeding their infants, while Group II included mothers who were exclusively breastfeeding. Demographic information and potential causative factors were collected using a structured questionnaire. The primary factors responsible for breastfeeding failure in Group I was documented, and similar issues were explored among mothers in Group II for comparison. Data analysis was performed using SPSS software (version 11). The results revealed that, compared to Group II, mothers in Group I experienced significantly more breastfeeding difficulties. The major factors associated with lactation failure included postoperative pain at the surgical site (10 cases), inadequate milk production (9 cases), breast abscess (4 cases), and lack of adequate breastfeeding counselling [7].

An experimental study evaluated the effectiveness of foot reflexology on lactation among parturient women. The intervention group received foot massage for 10-15 minutes daily within 30-120 hours after delivery, while the control group received no treatment. Lactation was initiated earlier in the treatment group (43.47 ± 12.39 hours) compared to the control group (66.97 ± 28.16 hours). Within 72 hours, satisfactory lactation was observed in 98% of the intervention group and 67% of the control group. The study concluded that foot reflexology effectively promotes lactation and reduces the need for pharmacological interventions [8].

A study conducted in 2019 reported breastfeeding rates of 75% in the early postpartum period, which declined to 43% at 6 months and 22.2% at 12 months. More than half of the mothers experienced inadequate breastfeeding, placing them at risk of lactation failure due to factors such as stress, fatigue, anxiety, anesthesia, prolonged labor, and surgical interventions. In the study, 60 postnatal mothers with lactation failure were selected using convenience sampling. Lactation levels were assessed using a Modified Breastfeeding Assessment Scale before and after the intervention. Pre-assessment showed lactation insufficiency in all mothers, while post-assessment revealed average lactation in 57% and adequate lactation in 43%. The mean lactation score increased from 5.3 to 19.92, with a statistically significant paired t-test value ($t = 47.29$, $p < 0.05$), demonstrating the effectiveness of reflex zone stimulation in improving lactation [9].

A comparative cross-over study examined the effects of reflexology in healthcare settings among 30 participants who received either reflexology or no treatment. Levels of self-reported anxiety, cardiovascular parameters (blood pressure and pulse rate), and milk supply were measured before and after the intervention. Reflexology significantly reduced state anxiety ($p < 0.001$) and cardiovascular activity, while also improving lactation, though it had no significant effect on trait anxiety. The study concluded that

reflexology promotes stress reduction and enhances milk production [10].

An experimental randomized controlled study was conducted to evaluate the effectiveness of foot and hand massage in improving lactation among mothers who underwent caesarean section using a pre-test and post-test design. The findings demonstrated that foot reflexology significantly enhanced lactation in the intervention group compared to the control group. Additionally, physiological parameters showed significant improvement immediately after the massage in the intervention group, indicating the statistical effectiveness of the intervention [11].

Methodology

Study Design

This study adopted a quantitative research approach, pre-experimental one-group pre-test post-test research design.

Design notation: O_1 - X - O_2

Where:

O_1 = Pre-test assessment of lactation

X = Reflex zone therapy

O_2 = Post-test assessment of lactation

Study Setting

The study was conducted in the post-natal ward of SCB Medical College and Hospital (MCH), Cuttack, Odisha, a tertiary care teaching hospital.

Study duration

The study was conducted over a period of 4-6 weeks, including pilot study, data collection, intervention, and analysis.

Sampling Method

In this study non-probability purposive sampling technique is used.

Sample size

A total of 40 postnatal mothers were included in this study. The sample size was determined using Yamane's formula.

According to Yamene's formula

$n = N/ (1+ N e^2)$

Here n= Sample size, N = Population size, e = Percentage of error i.e. 0.05

Inclusion Criteria

Post-natal mothers who:

- Had normal vaginal delivery or caesarean section
- Were in the first post-natal day
- Delivered full-term babies
- Were willing to participate in the study
- Could understand and communicate in the local language

Exclusion Criteria

Post-natal mothers who:

- Had contraindications to reflex zone therapy (e.g., deep vein thrombosis)
- Delivered premature or critically ill babies
- Were receiving lactation-stimulating medications

Description of the tools

Data were collected using three tools:

Tool-1: Self-structured socio-demographic questionnaire the variables affecting level of lactation among post- natal mothers. The socio-demographic tool consisted of six items related to personal history (Includes age, education, type of family, gravida, sex of baby, and birth weight).

Tool-2: LATCH Breastfeeding Assessment Scale- The LATCH Breastfeeding Assessment Scale is a standardized observational tool developed by Jensen, Wallace, and Kelsay (1994). to assess the effectiveness of breastfeeding among postnatal mothers. The scale is widely used in clinical and research settings to evaluate maternal and infant breastfeeding behaviors in a simple and systematic manner.

The acronym LATCH represents five key components of breastfeeding:

L - Latch on the breast, A - Audible swallowing, T - Type of nipple, C - Comfort (breast/nipple), H - Hold (positioning/help required).

Each component is scored on a 3-point Likert scale (0, 1, and 2) based on the observed breastfeeding performance.

Scoring Pattern:

Score 0: Poor or absent breastfeeding behavior

Score 1: Moderate or inconsistent breastfeeding behavior

Score 2: Effective and adequate breastfeeding behavior

The total score ranges from 0 to 10, with higher scores indicating better breastfeeding effectiveness and improved lactation.

Interpretation of Scores:

0-3: Poor lactation

4-6: Moderate lactation

7-10: Good lactation

Tool validation

Content validity: Reviewed by 5 experts (1 medical professionalism, 4 nursing professionalism). The tools demonstrated strong reliability, with Cronbach's α. values of 0.80 to 0.95. Pre-testing (tryout) done in hospital for clarity, ambiguity, and timing.

Study variables

- **Independent Variables:** Reflex Zone Therapy
- **Dependent Variables:** Level of lactation among post-natal mothers

Data collection procedure

The data collection for the present study was carried out after obtaining formal administrative permission from the concerned authorities of SCB MCH, Cuttack, Odisha, and ethical clearance from the Institutional Ethics Committee. The purpose of the study was explained to the postnatal mothers, and written informed consent was obtained prior to their participation.

The study participants were selected based on the inclusion and exclusion criteria using a non-probability purposive sampling technique. On the first day, baseline data were collected using a structured demographic proforma, which included variables such as age, education, parity, mode of delivery, and postnatal day.

The pre-test level of lactation was assessed using the LATCH Breastfeeding Assessment Scale through direct observation of breastfeeding. Following the pre-test assessment, reflex zone therapy was administered to the postnatal mothers. The intervention was provided once daily for 15-20 minutes for a period of five consecutive days by the investigator.

After completion of the intervention, the post-test assessment of lactation was conducted using the same LATCH Breastfeeding Assessment Scale to determine the effectiveness of reflex zone therapy. The collected data were checked for completeness, coded, and entered into a master data sheet for statistical analysis.

Ethical considerations

Ethical approval was obtained from the Institutional Ethics Committee of the Institute of Medical Odisha. Approval obtained from institutional authorities. Informed consent taken from participants. Confidentiality and anonymity maintained. Participants were given the right to withdraw at any time. No physical or psychological harm was caused.

Statistical Analysis

SPSS version 21 was used for data analysis. Demographic information and baseline characteristics were summarized using descriptive statistics, including mean values, standard deviations, and frequency counts. The data will be collected and analyzed with descriptive and inferential statistical techniques. The demographic variables will be analyzed by using frequency and percentage. The frequency tables will be formulated for all significant information.

Theoretical framework

A conceptual framework is a set of interrelated concepts that provides a systematic view of the phenomena under study. The conceptual framework for the present study was developed based on Imogene King's Goal Attainment Theory, which emphasizes interaction, perception, communication, and transaction between the nurse and the client to achieve desired health goals. In this study, the framework illustrates the relationship between reflex zone therapy (independent variable) and improvement of lactation (dependent variable) among postnatal mothers.

Input

- Postnatal mothers with lactation inadequacy
- Demographic variables (age, parity, education, mode of delivery, postnatal day)
- Nurse-mother interaction and assessment using LATCH scale

Process

- Establishment of nurse-mother relationship
- Explanation and demonstration of reflex zone therapy
- Administration of reflex zone therapy
- Monitoring and encouragement of breastfeeding

Output

- Improved lactation
- Increased LATCH breastfeeding score
- Enhanced maternal comfort and confidence

Feedback

- Reassessment of lactation using LATCH scale
- Mother's response and satisfaction
- Modification of nursing care if required

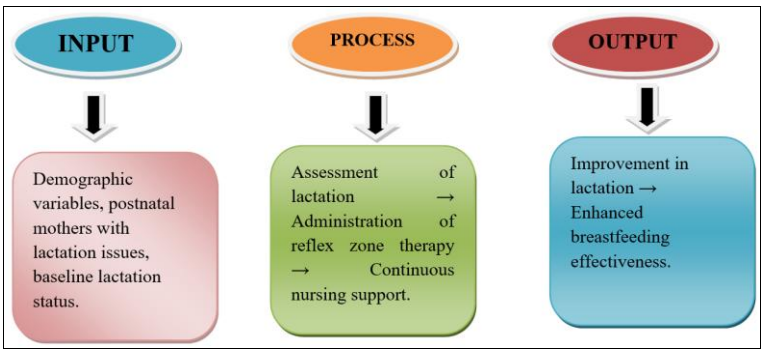

Fig 1: Input- Process- Output (IPO) model

Results

Table 1: Distribution of subjects based on sociodemographic variables. (N =40)

Sl. No.	Sociodemographic Variables	Category	Frequency (f)	Percentage (%)
1	Age (years)	20–25	10	25.0
		26–30	14	35.0
		31–35	9	22.5
		Above 35 years	7	17.5
2	Educational profile	No formal education	8	20.0
		Primary & Secondary education	18	45.0
		Higher secondary & above	14	35.0
3	Type of family	Joint family	22	55.0
		Nuclear family	18	45.0
4	Gravida	Primigravida	16	40.0
		Multigravida	24	60.0
5	Sex of the baby	Male	21	52.5
		Female	19	47.5
6	Birth weight of baby	2.5 – 3.0 kg	15	37.5
		3.0 – 3.5 kg	17	42.5
		3.5 – 4.0 kg	8	20.0

The above table-1 revealed that Frequency (F) and percentage (%) distribution of patients according to age, educational profile, types of family, gravid, sex of the baby, birth weight of baby.

Table 2: Data on over all pre and post-test level of lactation among postnatal mothers in postnatal word. (N =40)

Groups	Pre- test		Post- test	
	Frequency (f)	Percent (%)	Frequency (f)	Percent (%)
Least favorable	12	30	-	-
Favorable	28	70	14	35
Most Favorable	-	-	26	65

The data presented in table-2 revealed that the pre-test, out of 40 participants, 12 (30%) had a least favorable level and 28 (70%) had a favorable level, while none (0%) of the participants were in the most favorable category. In the post-test, a substantial improvement was observed, where 26 (65%) participants achieved a most favorable level and 14 (35%) had a favorable level, whereas none (0%) of the participants remained in the least favorable category. This finding indicates a clear improvement in the level of outcomes from pre-test to post-test among the study participants.

Table 3: Factor wise distribution of pre and post-test level of lactation scores among post-natal mothers. (N =40)

Factor	Pre-test			Post-test		
	Least favorable	Favorable	Most favorable	Least favorable	Favorable	Most favorable
Latch	25%	75%	0%	0%	42%	58%
Audible swallowing	18%	77%	5%	0%	50%	50%
Type of nipple	8%	57%	35%	0%	22%	78%
Comfort	45%	30%	25%	0%	45%	55%
Hold	30%	70%	0%	0%	80%	20%

Factor-wise analysis of lactation levels revealed that during the pre-test, the highest proportion of mothers (77%) demonstrated favorable scores for audible swallowing, while only 35% showed favorable scores related to type of nipple. Similarly, 77% and 75% of mothers had favorable scores for audible swallowing and latch, whereas 45% showed the least favorable scores for comfort. No mother achieved the most favorable score for latch and hold during the pre-test. In contrast, the post-test results showed that 78% of mothers attained the most favorable lactation scores for type of nipple, and none exhibited least favorable scores across all factors. These findings indicate that reflex zone therapy significantly improves lactation among postnatal mothers.

Table 4: Comparison between the pre-test and post-test level of lactation score among post-natal mothers. (N =40)

Test	Mean	Sd	Mean difference	Paired‘t’ value	Table value
Pre-test	4.4	1.69	3.2	14.27	2.02
Post-test	7.6	1.64			

The table indicates that the mean pre-test lactation score was 4.4, while the post-test mean score was 7.6 with a standard deviation of 1.64. The calculated paired t value was 14.27, which exceeded the table value of 2.02 at 39 degrees of freedom and the 0.05 level of significance. The p value (0.001) was less than 0.05, demonstrating that the post-test lactation level was significantly higher than the pre-test level.

Table 5: Association between post test level of lactation among postnatal mothers on promotion of lactation and their demographic variables. (N= 40)

Sl. No.	Demographic data	Chi-Square	Df	P Value	Level of Significance
1	Age of the mother	14.342	3	7.82	Non-significant
2	Educational profile	6.813	2	5.99	Non-significant
3	Types of family	3.956	1	3.84	Non-significant
4	Gravida	0.744	1	3.84	significant
5	Sex of the baby	4.095	1	3.84	Non-significant
6	Birth weight of baby	6.768	2	5.99	Non-significant

The chi-square test was used to determine the association between the post-test level of lactation and selected demographic variables, with the hypothesis tested at the 5% level of significance. The findings indicated no significant association between post-test lactation levels and variables such as maternal age, educational status, type of family, sex of the baby, and birth weight. However, a statistically significant association was observed between gravida and post-test lactation level at the 5% level of significance. Thus, it can be concluded that gravida influences lactation levels among postnatal mothers, where as other demographic variables do not show a significant effect.

Discussion

A systematic review and meta-analysis evaluated the effect of foot reflexology (FR) on lactation and breast milk volume among postpartum women, as evidence in this area is limited and inconsistent. Following PRISMA guidelines, six studies involving 364 women were included from an initial pool of 525 articles. The findings showed that FR significantly improved LATCH breastfeeding scores (MD = 0.98; $p < 0.001$). However, no significant improvement was observed in breast milk volume or early lactation onset symptoms on the first day, though improvements in lactation onset symptoms were noted on the second day

post-intervention. The review concluded that foot reflexology enhances breastfeeding effectiveness but does not significantly increase milk volume [12].

A randomized controlled pilot study evaluated the effectiveness of reflexology on lactation among post-cesarean mothers. Sixty women were randomly assigned to either a reflexology group (n = 30) or a control group (n = 30). Reflexology was administered for 20 minutes twice daily during the first two postoperative days, while the control group received routine nursing care. Lactation was assessed using the LATCH scale and visual analog scale (VAS) for lactation onset symptoms. The intervention group showed significantly higher LATCH scores on both days compared to the control group ($p < 0.001$). Improvements in breast tension, heat, and pain were also greater in the reflexology group on the second day. The study concluded that reflexology effectively enhances breastfeeding initiation and lactation indicators following cesarean section [13].

A randomized controlled trial examined the effects of foot reflexology on pain, fatigue, sleep quality, and breastfeeding among primiparous women following cesarean delivery. Eighty women were randomly assigned to reflexology (n = 40) or control (n = 40) groups. The intervention group received 40 minutes of foot reflexology weekly for 8 weeks, while the control group received routine care. The reflexology group showed significant reductions in pain and fatigue, along with improved sleep quality and breastfeeding efficacy, compared to the control group ($p < 0.05$). The study concluded that foot reflexology is a safe and effective intervention for reducing postnatal symptoms and enhancing breastfeeding outcomes [14].

Implications of the study

The present study was conducted baseline data for future research on complementary therapies in maternal and child health nursing. Further studies can be conducted with larger samples, control groups, and different settings to strengthen generalization. Comparative studies may be undertaken to evaluate reflex zone therapy against other lactation-promoting interventions**.** The findings encourage nurses to engage in evidence-based research to improve breastfeeding practices and maternal outcomes.

Limitation

Small sample size. Lack of control group. Short duration of intervention. Findings cannot be generalized to all settings.

Conclusion

The study findings concluded that reflex zone therapy significantly improved the level of lactation among post-natal mothers. Reflex zone therapy is a safe, non-pharmacological, cost-effective nursing intervention that can be incorporated into routine post-natal care to promote successful breastfeeding.

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Conflicts of interest

There are no conflicts of interest for the writers.

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Data Availibility

The data is available and can be accessed with a reasonable request.

Abbreviation

H: Hypothesis, n: Number of samples, df: Degree of freedom, t: t-test, χ^2: Chi-square test, SCB MCH: Srirama Chandra Bhanja Medical College & Hospital

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