International Journal of Nursing Research (IJNR)
International Peer Reviewed Journal

Research Article

# A Study to Assess the Effectiveness of Foot Reflexology for Prevention of Breast Engorgement among Lower Segment Cesarean Section Mothers in a Selected Hospital of a Metropolitan City

**Nilofar Loladiya[1], Jacintha Lobo[2]**

[1]Department of Obstetrician and Gynecology, Tutor, Bombay Hospital College of Nursing, Mumbai, Maharashtra, India, [2]Department of Obstetrician and Gynecology, P.D. Hinduja College of Nursing, Mumbai, Maharashtra, India

## ABSTRACT

**Background:** Puerperium is the period beginning immediately after the birth of the child and it is an important moment in the life of a woman. Breast engorgement is very common and has an effect on self and newborn care. Breast engorgement is distention or vascular congestion in the process of swelling of the breast tissue brought about by an increase in blood and lymph supply to the breast as the body produces milk, which precedes true lactation. Reflexology has huge health benefits and it alleviates women's pregnancy and nursing experiences too. Reflexology increases the health and well-being of women and provides a comforting and nurturing environment for both mother and baby. Lower segment cesarean section (LSCS) being an operative procedure restricts the movement of mother which hinders self and newborn care. Reflexology aims to engage body's own healing process, treating the person as a whole, i.e. the mind, body, and soul. **Aim:** This study aims to assess the effectiveness of foot reflexology for the prevention of breast engorgement among LSCS. **Materials and Methods:** A quasi-experimental design was used for this study. The study was performed on 80 postnatal mothers of postnatal ward of a selected hospital of a metropolitan city. **Results:** The study results show that there was a reduction in breast engorgement among LSCS mothers after the application of foot reflexology which was statistically verified. **Conclusion:** The analysis of data showed that foot reflexology can be used for the prevention of breast engorgement among LSCS mothers.

**Keywords:** Breast engorgement, Foot reflexology, Lower segment cesarean section

**Address for Correspondence:** Jacintha Lobo, Department of Obstetrician and Gynecology, P.D. Hinduja College of Nursing, Emerald Court, Kondivita Lane, Andheri East, Mumbai, Maharashtra, India. E-mail: nilofarlsalim@gmail.com

## Introduction

Breast engorgement is one of the most common ailments in the puerperium. The WHO estimates that incidences vary between 2.6% and 33%. The prevalence globally is approximately 10% of breastfeeding women.[1] Breast engorgement is distention or vascular congestion in the process of swelling of the breast tissue brought about by an increase in blood and lymph supply to the breast as the body produces milk, which precedes true lactation. The breasts are firm, tender, and hot and may appear shiny and taut. The areolae are firm and nipples may be flattened causing difficulty in latch.[2] Newborn remains unfed and leads to sequelae of problems like malnutrition.

The incidence rate of breast engorgement all over the world is 1:8000, and in India, it is 1:6500. Engorgement symptoms occur most commonly between the 3rd and 4th days of postpartum and more than two-thirds of women develop tenderness on the 5th day of postpartum, but some develop as late as the 9th–10th days of postpartum. Two-third of women

Access this article online

Website:www.innovationalpublishers.com/journal/ijnr | e-ISSN: 2456-1320

DOI: https://doi.org/10.31690/ijnr/90



**How to cite this article:** Loladiya N, Lobo J. A Study to Assess the Effectiveness of Foot Reflexology for Prevention of Breast Engorgement among Lower Segment Cesarean Section Mothers in a Selected Hospital of a Metropolitan City. Int J Nur Res. 2020; 6(1): 1-8.

experience at least moderate symptoms and 20% postnatal mothers, especially primigravida mothers, are affected with breast engorgement from 0 to 4 days of postnatal period.[3]
LSCS being an operative procedure restricts the movement of mother which hinders self and newborn care. The investigator during the clinical practice noticed that women opting for cesarean births have increased over normal birth.[4]
According to the Dorland's Medical Dictionary for health consumer, "Reflexology is a therapeutic technique based on the premise that areas in the hands or feet correspond to the organs and systems of the body and stimulation of these areas by pressure can affect the corresponding organ or system."[5] During foot reflexology, hypothalamus reflex area influences the release of oxytocin. By nerve response, a series of nerve and humoral regulations will occur which stimulate potential energy and increase immunity and anti-disease effect. Increased blood circulation and lymphatic drainage are also appreciated.[6]
Reflexology being non-invasive and absolute safe therapy with no side effects is a boon for expecting mothers as it provides an alternative choice adjuvant with other therapies to help the mothers cope better and maintain positive health.[7]
Breast engorgement is very common and has an effect on self and newborn care. Thus, reducing ailments can enhance the maternal recovery and mother-child bonding. For this, the investigator felt the need to conduct a study to assess the effectiveness of foot reflexology for the prevention of breast engorgement. According to Lowdermilk, Perry, and Medela, the prevention of breast engorgement means the measures taken as soon as after birth and frequently thereafter like breastfeeding to prevent the process of swelling of the breast tissue brought about by an increase in blood and lymph supply to the breast as the body produces milk, which precedes true lactation. Occurring at 72–96 h after birth, it lasts about 48 h and usually reaches a peak between the 3$^{rd}$ and 5$^{th}$ post-birth days.[2,8]
In this study, the prevention of breast engorgement refers to the effectiveness of foot reflexology as assessed with the use of checklist for breastfeeding pattern and the scores of assessment scale with modified numerical pain scale for breast engorgement on days 1, 3, 4, and 5 among lower segment cesarean section (LSCS) mothers. LSCS is lower segment cesarean section.[9] In this study, it refers to all the postnatal mothers who have undergone LSCS and admitted in the postnatal ward within 6 h on the day 1 post-LSCS with normal healthy newborn in a selected hospital of a metropolitan city.

## Materials and Methods

The research objectives have been met through the analysis of relevant data obtained through a study conducted in a selected hospital of a metropolitan city. A sample size of 80 LSCS mothers (40 experimental and 40 control groups) who were admitted in the postnatal ward of a selected hospital who fulfilled the inclusion criteria were selected and the data obtained were analyzed using dependent t-test. Further, the scoring is done using score key which was graded as mild, moderate, and severe to assess the breast engorgement.

### Research approach

This was a quantitative research approach.

### Research design

In this study, pretest-posttest control group design was used. In this research design, subjects are conveniently assigned to either the experimental group or the control group.

### Variable

- Independent variable: Foot reflexology.
- Dependent variable: Breast engorgement.

### Setting

The investigator conducted the study in the postnatal ward of a selected hospital in a metropolitan city.

### Sample

The subjects included in the study are postnatal mothers after 3 h of LSCS, who delivered alive neonates and were admitted for minimum 5 days postnatally in a selected hospital of a metropolitan city.

### Sample selection criteria for the study

The following criteria were set for the selection of sample:

#### *Inclusion criteria*

The following criteria were included in the study:
1. Postnatal mothers who had undergone LSCS irrespective of the type of anesthesia given.
2. Postnatal mothers who were willing to participate in the study.
3. Postnatal mothers with normal healthy newborns.
4. Postnatal mothers who understood English/Hindi.
5. Postnatal mothers who were admitted to the postnatal ward, for a minimum of 5 days postnatally.

#### *Exclusion criteria*

The following criteria were excluded from the study:
1. Postnatal mothers who had post-cesarean complications.
2. Postnatal mothers who had a stillbirth.
3. Postnatal mothers whose baby was admitted in the neonatal intensive care unit.
4. Postnatal mothers who had contraindications for breastfeeding.

5. Postnatal mothers who were admitted to the postnatal ward for more than 3 h post-LSCS.

### Hypotheses

$H_1$ – There is a significant difference in pre- and post-intervention scores of foot reflexology for the prevention of breast engorgement among LSCS mothers in the experimental group ($P = 0.05$).

$H_{01}$ – There is no significant difference in pre- and post-intervention scores of foot reflexology for the prevention of breast engorgement among LSCS mothers in the experimental group.

$H_2$ – There is a significant difference in pre-intervention scores and post-intervention outcome of foot reflexology among LSCS mothers of the experimental group with the control group ($P = 0.05$).

$H_{02}$ – There is no significant difference in pre-intervention scores and post-intervention outcome of foot reflexology among LSCS mothers of the experimental group with the control group.

### Sample size

The sample size was of 80 LSCS mothers ($n = 80$) who fulfilled the inclusion criteria for sample selection and were admitted in the postnatal ward of a selected hospital in a metropolitan city.

### Sampling technique

The sampling technique used in this study was convenient sampling technique. In this type of sampling technique, every available member of population is being picked as a subject.

### Data collection tool

The samples selected the investigator approached the concerned authority of selected hospital in a metropolitan city and discussed the objective of the study. A formal permission was taken from the authority consent, which was obtained from the participation. The present study was aimed to assess the effectiveness of foot reflexology for the prevention of breast engorgement.

- Section 1 – Demographic variables.
- Section 2 – Checklist for breastfeeding pattern.
- Section 3 – Assessment scale with modified numerical pain scale for breast engorgement.

### Results

Table 1 depicts the distribution of the subjects in relation to their age and education. Maximum subjects in the experimental and control groups 52.5% (21) and 45% (18), respectively, were in the age group of 25–29 years. Most of the subjects under the study were literate with 95% (38) in the experimental group and 92.5% (37) in the control group.

Table 2 shows that maximum subjects in the experimental and control groups 60% (24) and 62.5% (25), respectively, had parity status as two. In both the groups, 60% (24) of subjects had a history of breast engorgement in the previous pregnancy. Majority of the newborn in the experimental and control groups 92.5% (37) and 87.5% (35), respectively, were full term. Maximum subjects in the experimental and control groups 50% (20) and 47.5% (19), respectively, had initiated breastfeeding within 120–180 min of LSCS.

Table 3 represents the assessment of checklist for breastfeeding pattern among LSCS mothers in the experimental group. None of newborn were breastfed within an hour of LSCS. About 97.5% (39) of mothers breastfed their newborns minimum 8 times in pre-test which reduced to 92.5% (37) in post-test. All the newborns 100% were given prelacteal feed. About 55% (22) of mothers took galactagogues in pre-test which reduced to 35% (14) in post-test.

Table 4 represents the assessment of checklist for breastfeeding pattern among LSCS mothers in the control

**Table 1:** Distribution of subjects according to their demographic data, $n$=80

| Demographic variables | Experimental, $n$=40 | | Control, $n$=40 | |
|---|---|---|---|---|
| | F | % | F | % |
| Age of postnatal mother (years) | | | | |
| <24 | 12 | 30.0 | 14 | 35.0 |
| 25–29 | 21 | 52.5 | 18 | 45.0 |
| 30–34 | 6 | 15.0 | 6 | 15.0 |
| >35 | 1 | 2.5 | 2 | 5.0 |
| Education | | | | |
| Illiterate | 2 | 5.0 | 3 | 7.5 |
| Literate | 38 | 95.0 | 37 | 92.5 |
| Total | 40 | 100 | 40 | 100 |

**Table 2:** Distribution of subjects according to their clinical data, $n$=80

| Clinical data | Experimental, $n$=40 | | Control, $n$=40 | |
|---|---|---|---|---|
| | F | % | F | % |
| Parity | | | | |
| 1 | 15 | 37.5 | 9 | 22.5 |
| 2 | 24 | 60.0 | 25 | 62.5 |
| 3 and above | 1 | 2.5 | 5 | 15 |
| History of breast engorgement | | | | |
| Yes | 24 | 60.0 | 24 | 60.0 |
| No | 16 | 40.0 | 16 | 40.0 |
| Newborn status | | | | |
| Full term | 37 | 92.5 | 35 | 87.5 |
| Preterm | 3 | 7.5 | 5 | 12.5 |
| Time interval between LSCS and initiation of breastfeeding (min) | | | | |
| 120–180 | 20 | 50.0 | 19 | 47.5 |
| 181–240 | 15 | 37.5 | 16 | 40.0 |
| 241–300 | 5 | 12.5 | 5 | 12.5 |
| Total | 40 | 100 | 40 | 100 |

LSCS: Lower segment cesarean section

group. None of the newborns 0% were breastfed within an hour of LSCS (delivery). About 57.5% (23) of mothers breastfed their newborns minimum 8 times in pre-test which reduced to 50% (20) in post-test. All the newborns 100% were given prelacteal feed. About 60% (24) of mothers expressed breast milk in pre-test which reduced to 52.5% (21) in post-test. About 55% (22) of mothers took galactagogues in pre-test which reduced to 32.5% (13) in post-test.

Table 5 highlights the assessment of the level of breast engorgement scale among LSCS mothers in the experimental group. About 95% (38) had no engorgement on day 1 and 72.5% (29), 72.5% (29), 55% (22), and 52.5% (21) on day 3, day 4, day 5 pre-intervention, and day 5 post-intervention, respectively. About 5% (2) had mild engorgement on day 1 and 25% (10), 20% (8), 20% (8), and 25% (10) on day 3, day 4, day 5 pre-intervention, and day 5 post-intervention, respectively. About 0% had moderate engorgement on day 1 and 2.5% (1), 20% (5), 17.5% (7), and 15% (6) on day 3, day 4, day 5 pre-intervention, and day 5 post-intervention, respectively. About 0% had severe engorgement on day 1 and day 3 and 2.5% (1), 7.5% (3), and 7.5% (3) on day 4, day 5 pre-intervention, and day 5 post-intervention, respectively. In the experimental group, day-wise observations show that there is less number of samples shifting to more harsher grades of breast engorgement.

Table 6 focuses the assessment of the level of breast engorgement scale among LSCS mothers in the control group. About 97.5% (39) had no engorgement on day 1 and 85.5% (34), 52.5% (21), 35% (14), and 37.5% (15) on day 3, day 4, day 5 pre-intervention, and day 5 post-intervention, respectively. About 2.5% (1) had mild engorgement on day 1 and 12.5% (5), 32.5% (13), 20% (8), and 20% (8) on day 3, day 4, day 5 pre-intervention, and day 5 post-intervention, respectively. About 0% had moderate engorgement on day

**Table 3:** Assessment of checklist for breastfeeding pattern among LSCS mothers in the experimental group, *n*=40

| Breastfeeding pattern | Pre-test | | | | Post-test | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | F | % | F | % | F | % | F | % |
| Knowledge of proper breastfeeding pattern | 31 | 77.5 | 9 | 22.5 | 31 | 77.5 | 9 | 22.5 |
| Breastfeeding initiation within an hour of LSCS | 0 | 0.0 | 40 | 100 | 0 | 0.0 | 40 | 100 |
| Breastfeeding minimum 8 times/day | 1 | 2.5 | 39 | 97.5 | 3 | 7.5 | 37 | 92.5 |
| Top feeds | 7 | 17.5 | 33 | 82.5 | 7 | 17.5 | 33 | 82.5 |
| Prelacteal feed | 40 | 100 | 0 | 0.0 | 40 | 100 | 0 | 0.0 |
| Breast milk expression | 17 | 42.5 | 23 | 57.5 | 17 | 42.5 | 23 | 57.5 |
| Galactagogues intake | 22 | 55.0 | 18 | 45.0 | 26 | 65.0 | 14 | 35.0 |
| Total | 40 | 100 | 40 | 100 | 40 | 100 | 40 | 100 |

LSCS: Lower segment cesarean section

**Table 4:** Assessment of checklist for breastfeeding pattern among LSCS mothers in the control group, *n*=40

| Breastfeeding pattern | Pre-test | | | | Post-test | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | F | % | F | % | F | % | F | % |
| Knowledge of proper breastfeeding pattern | 25 | 62.5 | 15 | 37.5 | 25 | 62.5 | 15 | 37.5 |
| Breastfeeding initiation within an hour of LSCS | 0 | 0.0 | 40 | 100 | 0 | 0.0 | 40 | 100 |
| Breastfeeding minimum 8 times/day | 0 | 0.0 | 40 | 100 | 0 | 0.0 | 40 | 100 |
| Top feeds | 7 | 17.5 | 33 | 82.5 | 7 | 17.5 | 33 | 82.5 |
| Prelacteal feed | 40 | 100 | 0 | 0.0 | 40 | 100 | 0 | 0.0 |
| Breast milk expression | 16 | 40.0 | 24 | 60.0 | 19 | 47.5 | 21 | 52.5 |
| Galactagogues intake | 22 | 55.0 | 18 | 45.0 | 27 | 67.5 | 13 | 32.5 |
| Total | 40 | 100 | 40 | 100 | 40 | 100 | 40 | 100 |

LSCS: Lower segment cesarean section

**Table 5:** Assessment of the level of breast engorgement scale among LSCS mothers in the experimental group, *n*=40

| Level of breast engorgement | Day 1 | | Day 3 | | Day 4 | | Day 5 pre | | Day 5 post | |
|---|---|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | F | % | F | % |
| No engorgement | 38 | 95.0 | 29 | 72.5 | 29 | 72.5 | 22 | 55.0 | 21 | 52.5 |
| Mild engorgement | 2 | 5.0 | 10 | 25.0 | 8 | 20.0 | 8 | 20.0 | 10 | 25.0 |
| Moderate engorgement | 0 | 0.0 | 1 | 2.5 | 2 | 5.0 | 7 | 17.5 | 6 | 15.0 |
| Severe engorgement | 0 | 0.0 | 0 | 0.0 | 1 | 2.5 | 3 | 7.5 | 3 | 7.5 |
| Total | 40 | 100 | 40 | 100 | 40 | 100 | 40 | 100 | 40 | 100 |

LSCS: Lower segment cesarean section

1 and 2.5% (1), 15% (6), 35% (14), and 25% (10) on day 3, day4, day 5 pre-intervention, and day 5 post-intervention, respectively. About 0% had severe engorgement on day 1, day 3, and day 4 and 10% (4) and 17.5% (7) on day 5 pre-intervention and day 5 post-intervention, respectively.

In the control group observations, it is seen that more subjects have shifted harsher grades of breast.

Table 7 illustrates the assessment of the parameters of breast engorgement scale among LSCS mothers in the experimental group. Maximum pain (mean = 0.8) was recorded on day 5 pre-intervention. Changes in breast consistency (mean = 1.23) and skin texture (mean = 1.10) were noticed maximum on day 5 post-intervention. Least latch score (mean = 0.43) was observed on day 5 post-intervention. Maximum changes in nipple (mean = 0.88) were seen on day 5 pre- and post-intervention. Swelling (mean = 1.48) was maximum on day 4. Body temperature (mean = 0.28) was raised on day 5 pre-intervention. The presence of lump (mean = 0.70) was noticed mostly on day 3. Changes in mammary vein (mean = 0.53) and axillary lymph node (mean = 1.23) were maximum on day 5 post-intervention and day 4, respectively.

Table 8 explains the assessment of the parameters of breast engorgement scale among LSCS mothers in the control group. Maximum pain (mean = 1.0) was recorded on day 5 pre-intervention. Changes in breast consistency (mean = 1.53) and skin texture (mean = 1.40) were noticed maximum on day 5 pre- and post-intervention, respectively. Least latch score (mean = 0.68) was observed on day 5 post-intervention. Maximum changes in nipple (mean =

**Table 6:** Assessment of the level of breast engorgement scale among LSCS mothers in the control group, *n*=40

| Level of breast engorgement scale in the control group | Day 1 | | Day 3 | | Day 4 | | Day 5 pre | | Day 5 post | |
|---|---|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | F | % | F | % |
| No engorgement (<10) | 39 | 97.5 | 34 | 85.5 | 21 | 52.5 | 14 | 35.0 | 15 | 37.5 |
| Mild engorgement (10–12) | 1 | 7.5 | 5 | 12.5 | 13 | 32.5 | 8 | 20.0 | 8 | 20.0 |
| Moderate engorgement (13–15) | 0 | 0.0 | 1 | 2.5 | 6 | 15.0 | 14 | 35.0 | 10 | 25.0 |
| Severe engorgement (16–20) | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4 | 10.0 | 7 | 17.5 |
| Total | 40 | 100 | 40 | 100 | 40 | 100 | 40 | 100 | 40 | 100 |

LSCS: Lower segment cesarean section

**Table 7:** Assessment of the parameters of breast engorgement scale among LSCS mothers in the experimental group, *n*=40

| Assessment of parameters of breast engorgement scale in the experimental group | Day 1 mean | Day 3 mean | Day 4 mean | Day 5 pre mean | Day 5 post mean |
|---|---|---|---|---|---|
| Pain | 0.25 | 0.38 | 0.60 | 0.80 | 0.55 |
| Consistency of breast | 0.58 | 0.85 | 1.10 | 1.18 | 1.23 |
| Skin texture | 0.63 | 0.88 | 0.98 | 1.05 | 1.10 |
| Latch | 1.38 | 0.83 | 0.73 | 0.48 | 0.43 |
| Nipple | 0.75 | 0.75 | 0.83 | 0.88 | 0.88 |
| Swelling | 0.98 | 1.28 | 1.48 | 1.30 | 1.30 |
| Body temperature | 0.03 | 0.23 | 0.18 | 0.28 | 0.03 |
| Presence of lump | 0.10 | 0.70 | 0.45 | 0.68 | 0.68 |
| Mammary veins | 0.08 | 0.23 | 0.30 | 0.48 | 0.53 |
| Axillary lymph node | 0.38 | 1.18 | 1.23 | 1.08 | 1.05 |

LSCS: Lower segment cesarean section

**Table 8:** Assessment of the parameters of breast engorgement pain scale among LSCS mothers in the control group, *n*=40

| Assessment of parameters of breast engorgement pain scale in the control group | Day 1 mean | Day 3 mean | Day 4 mean | Day 5 pre mean | Day 5 post mean |
|---|---|---|---|---|---|
| Pain | 0.03 | 0.25 | 0.73 | 1.00 | 0.80 |
| Consistency of breast | 0.53 | 0.95 | 1.28 | 1.53 | 1.48 |
| Skin texture | 0.65 | 0.93 | 1.20 | 1.38 | 1.40 |
| Latch | 1.53 | 1.00 | 0.88 | 0.73 | 0.68 |
| Nipple | 0.48 | 0.58 | 0.93 | 1.00 | 1.05 |
| Swelling | 0.83 | 1.10 | 1.38 | 1.50 | 1.58 |
| Body temperature | 0.00 | 0.13 | 0.10 | 0.18 | 0.10 |
| Presence of lump | 0.10 | 0.28 | 0.50 | 0.80 | 0.88 |
| Mammary veins | 0.08 | 0.28 | 0.53 | 0.68 | 0.73 |
| Axillary lymph node | 0.43 | 1.00 | 1.20 | 1.38 | 1.38 |

LSCS: Lower segment cesarean section

1.0) were seen on day 5 pre-intervention. Swelling (mean = 1.58) and body temperature (mean = 0.18) were raised on day 5 post- and pre-intervention, respectively. The presence of lump (mean = 0.88) and changes in mammary vein (mean = 0.73) were noticed mostly on day 5 post-intervention. Changes in axillary lymph node (mean = 1.38) were maximum on day 5 pre- and post-intervention.

Table 9 illustrates the comparison of breast engorgement scale within the experimental group among LSCS mothers in a selected hospital of a metropolitan city to prove the effectiveness of foot reflexology.

The Wilcoxon calculated value, W was found to be 16.5 for day 1 with day 3, 36 for day 1 with day 4, 183 for day 1 with day 5 pre, 196 for day 1 with day 5 post, and 342 for day 3 with day 5 post. After conversion into Z stat, the calculated "Z" value for all was found to be statistically significant and more than the critical Z value of 1.96 except that of day 3 with day 5 post comparison for which the calculated Z value was 0.66 which is statistically <1.96, hence not significant.

There is a significant difference in before and after the intervention of foot reflexology for all comparison, and hence, the alternate hypothesis ($H_1$) is accepted and the null hypothesis ($H_{01}$) is rejected. The results thus suggest that the application of foot reflexology is effective in the prevention of breast engorgement in the experimental group among LSCS mothers.

Table 10 displays the comparison between the experimental and control groups on breast engorgement scale among LSCS mothers in selected hospitals of a metropolitan city.

The Mann–Whitney U-test was done as the data were in the ordinal format as well as two different groups were compared, as presented in Table 10.

The Mann–Whitney calculated U value was found to be 684 for day 1, 654 for day 3, 652 for day 4, 514 for day 5 pre, and 506 for day 5 post. After conversion into Z stat, the calculated Z value was found to be statistically <1.96 for day 1, day 3, and day 4 comparison between the experimental and control groups, hence not significant. Therefore, the null hypothesis ($H_{02}$) is accepted and ($H_2$) is rejected for day 1, day 3, and day 4 comparison.

Whereas day 5 pre and day 5 post comparison shows that the calculated Z values are statistically more than the Z table value of 1.96, hence they are significant. This proves that there is a statistically significant difference between the effect of foot reflexology in the experimental group and standard care in the control group.

Table 11 displays the association of breast engorgement scale with breastfeeding checklist in the experimental group. All the calculated Chi-square values of breastfeeding checklist questions are less than their respective Chi-square table value at 0.05 levels. Hence, they are not significant, which states that there is no statistically significant difference between the groups of breastfeeding checklist with respect to their breast engorgement scale.

Table 12 illustrates the association of breast engorgement scale with breastfeeding checklist in the control group.

All the calculated Chi-square values of breastfeeding checklist questions except galactagogues intake are less than their respective Chi-square table value at 0.05 levels, hence insignificant, whereas calculated Chi-square value (4.26) of galactagogues Intake is more than the Chi-square table value (3.84), thus significant.

**Table 9:** Effectiveness of foot reflexology by comparing day-wise scores of breast engorgement scale within the experimental group, *n*=40

| Breast engorgement scale comparison within the experimentasl group | Mean | W value | Z value | *P* value |
|---|---|---|---|---|
| Day 1 | 5.13 | 16.5 | 5.09 | 0.000 |
| Day 3 | 7.40 | | | |
| Day 1 | 5.13 | 36 | 4.48 | 0.000 |
| Day 4 | 7.85 | | | |
| Day 1 | 5.13 | 183 | 2.89 | 0.004 |
| Day 5 pre | 8.20 | | | |
| Day 1 | 5.13 | 196 | 2.53 | 0.011 |
| Day 5 post | 7.80 | | | |
| Day 3 | 7.40 | 342 | 0.66 | 0.505 |
| Day 5 post | 7.80 | | | |

Level of significance is 0.05 for "Z" table value of 1.96

## Discussion

Breast engorgement is a physiological process that commences on day 3 postnatally and usually resolves by day 5. If the mother has improper breastfeeding pattern,

**Table 10:** Effectiveness of foot reflexology in the experimental group versus standard care in the control group regarding breast engorgement scale, *n*=80

| Comparison of breast engorgement scale between groups | Mean | Rank total | U value | Z value | *P* value |
|---|---|---|---|---|---|
| Day 1 | | | | | |
| Experimental | 5.13 | 1735 | 684 | 1.132 | 0.268 |
| Control | 4.60 | 1504 | | | |
| Day 3 | | | | | |
| Experimental | 7.40 | 1766 | 654 | 1.415 | 0.157 |
| Control | 6.48 | 1474 | | | |
| Day 4 | | | | | |
| Experimental | 7.85 | 1472 | 652 | 1.425 | 0.154 |
| Control | 8.70 | 1767 | | | |
| Day 5 pre | | | | | |
| Experimental | 8.20 | 1327 | 514 | 1.968 | 0.049 |
| Control | 10.17 | 1813 | | | |
| Day 5 post | | | | | |
| Experimental | 7.80 | 1311 | 506 | 1.971 | 0.049 |
| Control | 9.92 | 1809 | | | |

**Table 11:** Association of breastfeeding checklist with breast engorgement scale in the experimental group, *n*=40

| Association of breastfeeding checklist with breast engorgement scale | *n* | mean rank | df | Calc. $\chi^2$ value | Table $\chi^2$ value | *P* value |
|---|---|---|---|---|---|---|
| Knowledge of proper breastfeeding pattern | | | | | | |
| No | 9 | 23.56 | 1 | 0.80 | 3.84 | 0.370 |
| Yes | 31 | 19.61 | | | | |
| Breastfeeding minimum 8 times/day | | | | | | |
| No | 37 | 20.38 | 1 | 0.05 | 3.84 | 0.816 |
| Yes | 3 | 22.00 | | | | |
| Top feeds | | | | | | |
| No | 33 | 20.17 | 1 | 0.13 | 3.84 | 0.693 |
| Yes | 7 | 22.07 | | | | |
| Breast milk expression | | | | | | |
| No | 23 | 22.24 | 1 | 1.21 | 3.84 | 0.271 |
| Yes | 17 | 18.15 | | | | |
| Galactagogues intake | | | | | | |
| No | 14 | 19.86 | 1 | 0.06 | 3.84 | 0.797 |
| Yes | 26 | 20.85 | | | | |

**Table 12:** Association of breastfeeding checklist with breast engorgement scale in the control group, *n*=40

| Association of breastfeeding checklist with breast engorgement scale | *n* | Mean rank | df | Calc. $\chi^2$ value | Table $\chi^2$ value | *P* value |
|---|---|---|---|---|---|---|
| Knowledge of proper breastfeeding pattern | | | | | | |
| No | 15 | 22.33 | 1 | 0.60 | 3.84 | 0.439 |
| Yes | 25 | 19.40 | | | | |
| Top feeds | | | | | | |
| No | 33 | 19.97 | 1 | 0.39 | 3.84 | 0.531 |
| Yes | 7 | 23.00 | | | | |
| Breast milk expression | | | | | | |
| No | 21 | 18.50 | 1 | 1.31 | 3.84 | 0.252 |
| Yes | 19 | 22.71 | | | | |
| Galactagogues intake | | | | | | |
| No | 13 | 25.96 | 1 | 4.26 | 3.84 | 0.039 |
| Yes | 27 | 17.87 | | | | |

then it turns into pathology such as breast infection, breast abscess, and mastitis, which hampers the health of the mother as well as the newborn.

In this study, the investigator had wielded Ernestine Wiedenbach's The Helping Art of Clinical Nursing theory. All the concepts of the theory, i.e., art of clinical nursing, realities, central purpose, and a need for help are closely knit which fits well in the present study to identify foot reflexology as a measure to prevent the development of breast engorgement among LSCS mothers.

A quantitative experiment approach and pretest-posttest control group design were selected by the investigator for the assessment of the effectiveness of foot reflexology for the prevention of breast engorgement among LSCS mothers. Conveniently assigned the LSCS mothers admitted in a postnatal ward in a selected hospital as per inclusion and exclusion criteria into groups, i.e., the experimental and control groups.

The primary objective of the study to assess the effectiveness of foot reflexology for the prevention of breast engorgement among LSCS mothers is fulfilled as the experimental group ranks are statistically lower than that of the control group, it is recommended that foot reflexology is better than standard care in the prevention of breast engorgement among LSCS mothers.

Hence, the secondary objective to compare pre-intervention scores and post-intervention outcome of foot reflexology for the prevention of breast engorgement of LSCS mothers in the experimental group with the control group is also achieved.

## Conclusion

The present study was conducted to assess the effectiveness of foot reflexology for the prevention of breast engorgement among LSCS mothers in a selected hospital of a metropolitan city. Findings of the study were effective in relieving the extra tension caused due to breast engorgement and continue with normal puerperium. Above all with the present study, investigator was able to understand if not whole but definitely the parts of research process which will surely serve fruitful in future.

**References**


1. Breast Engorgement; 2017. Available from: http://www.en.wikipedia.org/w/index.php?title=Breast_engorgement&oldid=814465449. [Last accessed on 2018 Feb 13].
2. Lowdermilk DL, Perry SE. Maternity and Women's Health Care. 10th ed. St. Louis: Mosby Publishers, Elsevier Publications; 2011.
3. Subiaco WA. Women and Newborn Health Service. Breast Feeding and Breast Care. King Edward Memorial Hospital; 2007. Available from: http://www.wnhs.health.wa.gov.au-2007.
4. Available from: https://www.qz.com/326402/cesarean-births-in-india-are-skyrocketing-and-there-is-reason-to-be-very-worried.
5. Reflexology. Dorland's Medical Dictionary for Health Consumers; 2007. Available from: http://www.medical-dictionary.thefreedictionary.com/reflexology. [Last accessed on 2018 Feb 12].
6. Tiran D, Evans M. 6-Structural Reflex Zone Therapy for the Puerperium. In: Reflexology in Pregnancy and Childbirth. Edinburgh: Churchill Livingstone; 2010. p. 126-46. Available from: http://www.sciencedirect.com/science/article/pii/B9780 702031106000065.
7. Valiani M, Shiran E, Kianpour M, Hasanpour M. Reviewing the effect of reflexology on the pain and certain features and outcomes of the labor on the primiparous women. Iran J Nurs Midwifery Res 2010;15:302-10.
8. Wilson-Clay B. Relieving and Treating Engorged Breasts, Medela. Available from: http://www.medelabreastfeedingus.com/tips-and-solutions/47/relieving-and-treating-engorged-breasts.
9. Obstetrics Lower Segment Caesarean Section, The Oxford Dictionary of Abbreviations. Available from: http://www.encyclopedia.com. [Last accessed on 2017 Sep12].