Effect of foot reflexology on breast engorgement among lactating mothers

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Abstract

Background: Breast engorgement is a very common and painful postnatal condition that affects both the mother and the newborn. Breast engorgement is the distention and swelling of the breast, that precedes true lactation. Postpartum reflexology has huge health benefits for the mother and the newborn. It increases the health and well-being of women and provides a comforting and nurturing environment for both mother and baby. **Aim:** To evaluate the effects of foot reflexology on lactating mothers' breast engorgement. **Methods:** A quasi-experimental research design was used. Conducted at the postpartum outpatient follow up, Minia University Hospital for Obstetrics and Pediatrics, Egypt; with a sample size of 100 lactating mothers divided into two groups (study and control), each with 50 women. The structured interview, the six-point engorgement scale, the Visual Analogue Scale, and the breastfeeding LATCH Scale were the four tools used. Foot reflexology was implemented in the study group. **Results:** There was a highly statistically significant difference between the study and control groups regarding the level of breast engorgement after the intervention. **Conclusion:** For the management of breast engorgement, foot reflexology proved to be an efficient non-pharmacological therapy. **Recommendations:** Planning and developing antenatal classes for all women to improve their knowledge and self-care practices regarding foot reflexology as a method to manage breast engorgement.

Keywords: foot reflexology, breast engorgement, lactating mothers.

Introduction:

Breast engorgement is one of the most common mild discomforts that nursing mothers, especially primiparous women, have after birth **(Loladiya & Lobo, 2019).** Breast problems are extremely common during the postpartum period. According to statistics, the global incidence rate of breast engorgement among nursing mothers in 2019 was 65% to 75%, but it was 82% in Egypt **(Abd El-hady et al., 2019).**

Breast engorgement is breast enlargement and fullness of milk. According to the lactation literature, swollenness is a physiological condition characterized by painful swelling of the breast during the first two weeks of life, a sudden increase in milk supply, lymphatic and vascular congestion, and interstitial edema **(Hassan et al., 2019).**

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. The breasts are rigid, tinder-like, swollen, and warm, with a throbbing sensation. There is a low-grade fever and the skin is tight, glossy, or translucent. Tenderness and swelling in the axilla may occur. The areola is firm and the nipple may flatten, and the areola is too hard to grasp, making it difficult for a newborn to latch on. Two-thirds of women experience at least moderate symptoms. Newborn remains unfed and leads to sequelae of problems like malnutrition **(Loladiya & Lobo , 2019).**

Simply the areola, only the body of the breast, or both can be affected by engorgement. It can affect either one or both breasts. Areolar engorgement involves clinical observations of a swollen areola with tight, shiny skin, probably involving over-full lactiferous sinuses **(Hassan et al., 2019).**

If breast engorgement is not handled promptly, it can cause problems such as feeding difficulties or delayed weight gain if the baby is unable to latch on to the engorged breast, as well as sore and cracked nipples from the infant fumbling on/off as he tries to grab a too hard breast, deep breast, thrush (a fungal infection can be formed on the nipple or within the breast, especially cracked nipple or congested breast), plugged ducts results from the accumulation of milk or dead cells that have not been expelled from the breast, and mastitis **(Monazzami et al., 2019).**

For managing breast engorgement, a variety of pharmaceutical and non-pharmacological methods have been suggested. Pharmacological methods include a variety of side effects, and mothers are anxious about how they may affect

their newborns **(Khosravan et al., 2017).** As a result, non-pharmacological approaches have received a lot of attention in recent years. Frequent nursing, hot compresses before breastfeeding, cold treatment, spa showers, reflexology, and medicinal plants including cabbage, peppermint, sage, and hollyhock are among these strategies **(Mahmoud et al., 2019).**

Since 2330 BC, reflexology has been regarded as a part of Egyptian culture. Every region of the foot correlates to a different section of the body, and massaging the feet stimulates the corresponding part of the body, making reflexology the equivalent of a full-body massage. Generally, it affects the physiological and psychological stimulation points. It can be used for treating many physiological conditions such as nausea, pregnancy vomiting, constipation, edema, headache, fatigue, low back pain and to help to breastfeed. Reflexology has stimulating effects on the central nervous system (CNS) and mood-enhancing effects, and causes deep relaxation; hence, reducing mental stress and pressure and improving blood flow **(Allam, 2019).**

Foot reflexology is a complementary therapy that is often used in palliative care or to alleviate a condition without dealing with the underlying cause to improve a patient's emotional, physiological and spiritual health, and increase the value of their life **(Abdelmoneam, 2018).**

Concerning professional practice, nurses contribute to the health and well-being of women, children, and families by encouraging skilled and specialized care in the clinical management of breastfeeding. They should also teach and demonstrate how to express milk to women so that they can be prepared for feeding their babies and avoid breast engorgement **(El-Saidy & Aboushady, 2016).**

Many organizations support the interprofessional education of patients and families regarding breastfeeding and related issues. The American College of Nurse-Midwives states that health care providers should participate in comprehensive education to educate and support breastfeeding practices. With multiple platforms of text messaging, phone calls, and distance support for breast engorgement, the opportunity to give appropriate guidance and support to women who are lactating may lead to an even greater increase in successful long-term breastfeeding outcomes **(Gresh et al., 2019).**

Significant of the study:

Breast engorgement is one of the most common postpartum complications that occur between the third and fourth days. It keeps the nipple and areola out of the mouth of the baby, hindering effective breast milk flow. This causes significant breast engorgement, which can be extremely uncomfortable. Inadequate breast milk intake will develop as a result, impeding normal newborn growth **(El-Saidy & Aboushady, 2016).** Breast problems are extremely common during the postpartum period. According to statistics, the global incidence rate of breast engorgement among nursing mothers in 2019 was 65 % to 75 %, but it was 82 % in Egypt **(Abd El-hady et al., 2019).**

Reflexology should be used in pediatric research to empower Egyptian mothers of premature newborns to learn a new, safe, and economical technique that will add to their good experience before being discharged from the hospital and ensures adequate breast milk supply for their babies **(Allam, 2019).** Thus, reducing ailments can enhance maternal recovery and mother-child bonding. For this, the investigator felt the need to conduct a study to assess the effectiveness of foot reflexology on breast engorgement among lactating mothers **(Loladiya & Lobo, 2019).**

Aim of the study:

To evaluate the effects of foot reflexology on breast lactating mothers' engorgement

Research hypothesis:

Implementation of foot reflexology is expected to reduce engorgement among lactating mothers.

Subjects and methods:

The **s**ubjects and methods of this study are displayed into four designs technical, operational, administrative, and statistical design.

I. Technical Design:

Which involved research design, setting, study sample, tools of data collection, validity, reliability and pilot study.

Research Design:

A quasi-experimental design was used in this study. This study was used as it replicates findings before and after intervention in study and control group.

Setting:

This study was conducted at the postpartum outpatient follow-up clinics, Minia University Hospital for Obstetric and Pediatric (MUHOP), Egypt that presents on the first floor of the hospital and involved two rooms one for examination and the other had an ultrasound. MUHOP services all areas of Upper Egypt.

Sample:

A purposive sample of 100 postpartum lactating mothers with breast engorgement was generated. With a 95% confidence coefficient, a 10% tolerated error, a 50% expected frequency, and population size of 350, the sample size was computed using the Epi info tool. A total of 100 postpartum mothers were included in the study. The sample was divided into two main groups' study (who applied foot reflexology) and control (who received routine hospital care), each group involved 50 postpartum women.

Randomization:

A single column with two groups between 1 and 100 was made using the random integer generator method from the "Numbers" subheading on the Random.org site **(Random, 2019).** At the beginning of the study, the number of women was assigned to the study or control groups that were determined by drawing lots. Women who had the number 1 in the column were assigned to the study group, while women who had number 2 were assigned to the control group.

Inclusion criteria:

All postpartum lactating women admitted to postpartum outpatient follow up clinics, MUHOP, Egypt, criteria of had a normal healthy, term and singleton newborns, breast engorgement in the first 5 days after delivery, obtaining a minimum score of 4 from the degree of engorgement checklist, non-use of antibiotic.

Exclusion criteria:

Postpartum mothers with the following criteria were excluded from the study:

- Had postpartum complications.
- Had a stillbirth.
- Her baby was admitted to the NICU.
- Had contraindications for breastfeeding
- The use of herbal topical drugs or chemicals or the need for an anti-inflammatory drug
- The occurrence of mastitis or breast abscess, or cracked nipple.
- Mothers with a body temperature above 38 ° C

Tools of the study

There are four tools were used in this study:-

Tool (I): Socio-demographic and obstetric data structured interview questionnaire

It involved 1-personal data such as age, living area, educational status, and occupation. **2-obstetric history** as parity, mode of delivery, gender of newborn, number of postpartum days, time of initiation of breastfeeding, duration of breastfeeding. **3-breast engorgement data** as symptoms of current breast engorgement.

Tool (II): Six-point engorgement scale:

It was created by **(Hill & Humenick, 1994).** It was used to determine the extent of breast engorgement, using a scoring system ranging from 1 to 6. Score as (1) for soft and no changes in the breast, (2) for slight changes in the breast, (3) for a firm and no tender breast, (4) for a firm and beginning tenderness in the breast, (5) for firm and tender of the breast, and (6) for a very firm and tender of the breast.

Tool (III): Visual Analogue Scale (VAS)

The visual analogue scale (VAS) was first used in the 1960s **(Gift, 1989).** It consisted of a blank line with adjectives that described the extremes of pain at each end. It was intended to assess the degree of pain severity. A 10 cm line is generally used for simplicity of measurement. The anchoring adjectives "no pain" and "severe pain" are frequently used (worst possible pain). The postnatal women are asked to mark the line that best represents the level of pain they are experiencing. A numeric rating of the pain severity is obtained by measuring from the end of the line to the mark made by the postnatal women. **Scoring:** the score of zero (0) indicates no pain and the top score (10) indicates the worst possible pain. The VAS was divided into three sections, the first of which was graded from 1-3 cm for mild pain, the second from 4-7 cm for moderate pain, and the third from 8-10 cm for severe pain.

Tool (VI): Breastfeeding LATCH Scale:

This scale was developed **by Jenson, Wallase, and Kelsay (1994)** based on the model of the Apgar scoring system**.** Its simplicity makes systematic documentation and communication easy. Five critical breastfeeding components indicated by the letters of the acronym LATCH are given a number score (0, 1, or 2) by the system. "L" indicates how well the infant latches onto the breast, "A" indicates the amount of audible swallowing noted, "T" indicates the

mother's nipple type/condition, "C" indicates the mother's level of comfort, and "H" indicates the amount of assistance the mother requires to hold her infant to the breast. An overall score is a number between 0 and 10. Scoring least favorable = (1- 3), favorable = (4 – 6), and most favorable = (7 – 10).

Tools Validity:

A panel of five specialists in the fields of maternity and newborn health nursing, as well as obstetrics and gynecological medicine, examined the tools for clarity and comprehensiveness.

Tools Reliability:

Reliability analysis was measured using the Cronbach Alpha coefficient and was found to be 0.862 for a structured interview questionnaire. The reliability of the six-point breast engorgement scale and Visual Analogue Scale was found 0.816 and 0.96 respectively. And found 0.780 on breastfeeding LATCH Scale.

Pilot study:

To test the clarity of the research tools, a pilot study was conducted on 10% of the study population. The pilot study's sample was involved in the study because the tools had not been changed.

Ethical considerations:

Ethical approval was obtained from the scientific research ethical committee at the Faculty of Nursing, Minia University. Informed consent was obtained from each woman after explaining the aim of the study. Tools of data collection were not touched on the moral, religious, ethical, and cultural aspects of women's life. Confidentiality was maintained. The lactating mother had the option to withdraw from the study at any time.

II) Operational design:

The operational design included the preparatory phase, pilot study, and fieldwork.

Preparatory phase:

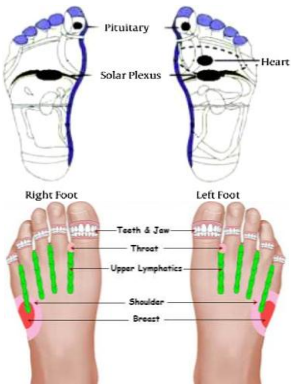
Official permission was obtained from MUHOP, Chairman in Minia University, as well as an ethical approval on the ethical committee of the Faculty of nursing at Minia University. Before participating in the study, each woman gave her verbal informed consent. A foot reflexology massage training curriculum has been provided to the researcher. Before being included in the study, a six-point engorgement scale was utilized to assess the existence of engorgement, with a score of 4 or more indicating participation.

Fieldwork:

Data collection of the study took about 6 months starting at the beginning of January 2019 and was completed by the end of June 2019. It involved two phases as the following:

Intervention phase:

- The researcher interviewed the woman at the postpartum outpatient follow-up clinics, and an engorgement assessment scale (tool II) was applied to the woman to determine the presence of breast engorgement. A woman with a score of 3 or more was involved in the study.
- Using the random integer generator method, the woman's group was determined. The nature of the study was explained and a woman's consent was taken to be included in the study.
- Data in the tool (I), (III), and (VI) was collected from both groups (study and control group) through interviews after involvement in the study (before intervention).
- The **control group (**50 women) followed routine hospital care (lactation technique training, repeated feeding, and warm compress).
- For the **study group,** which comprises 50 women, the researcher trained the mother to perform foot reflexology. The method was practiced clinically in front of a woman; foot reflexology was performed for 20 minutes, 10 minutes on each foot, in three zones of the solar network (3 minutes), breast (3 minutes), lymphatic system (3 minutes). One minute was allocated for general massage, once a day for three consecutive days for mothers **(Loladiya & Lobo, 2019).**



Post-intervention:

- Tools II, III, and VI were used to assess engorgement score, pain intensity, and breastfeeding latch process respectively for both groups after 3 days (after intervention).

III- Administrative design:

This study was carried out with the approval of Minia University's faculty of nursing's ethical committee, as well as official permission from the director of MUHOP, each woman who participated in the study gave informed consent, and confidentiality was ensured. The woman has the option to leave the study at any time.

IV-Statistical design:

Statistical Package for Social Sciences (SPSS) V.26 was used to organize, categorize, code, tabulate, and analyze the acquired data. In tables and charts, data was represented using numbers, percentages, averages, and standard deviations. The chi-square test was used to establish statistical significance, and the Pearson correlation between variables was used. A statistically significant P-value of 0.05 was used.

Results:

Table (1): Regarding personal characteristics, it was illustrated that 64% of studied women in the study group and 60% in the control group had an age group from (25-<35) years**.** Concerning Living areas, 62% in the study group and 58% in the control group were from rural areas. Regarding occupation, 72% of studied women in the study group and 76%in the control group were housewives. As regards educational status 50% of the studied sample in the study group and 46% in the control group had a secondary level of education, with no statistically significant difference between the study and control group (P >0.05).

Table (2): Clarifies obstetric history of studied women and reports that 58% of studied women in the study group and 52% in the control group were primigravidas. The mode of delivery was a cesarean section in 54% of the study group and 52 % in the control group. About 58% of studied women in the study group and 62% in the control group had a girl newborn's gender. Regarding postpartum days 76% in the study group and 80 % in the control group were on the 3rd day postpartum. Concerning time of initiation and duration of breastfeeding after labor, about 84% and 86% of studied women in the study group and 82% and 88% in the control group initiated breastfeeding after 5 hours postpartum with a duration of <10 minutes respectively, with no statistically significant differences between the study and control groups regarding obstetric history (P>0.05).

Figure (1): Demonstrates symptoms present in current breast engorgement before the intervention, and shows that breast pain was the most common symptom with a percent of 90% in the study and 92.5% in the control group followed by warmness and redness, with no statistically significant differences between study and control groups (P>0.05).

Table (3): Shows the level of breast engorgement in the study and control groups before and after the intervention, and reports that there was no statistically significant difference between the study and control groups before intervention (P>0.05), but there was a highly statistically significant difference between the study and control groups after intervention (P <0.01).

Table (4): The level of pain in the study and control groups before and after the intervention is revealed, as well as the fact that there was no statistically significant difference between the study and control groups before intervention (P>0.05), but that there was a highly statistically significant difference between the study and control groups after intervention (P<0.01).

Figure (2): Shows breastfeeding LATCH in the study and control groups before and after the intervention and finds that there was no statistically significant difference between the study and control groups before intervention (P>0.05), but there was a highly statistically significant difference between the study and control groups after intervention (P<0.01).

Table (5): Clarifies the relationship between personal characteristics, obstetric history of studied women in the study and control group, and level of breast engorgement before the intervention, and reveals that there was a highly positive relationship between the level breast engorgement before intervention and mother's age, educational status, parity, mode of delivery, time of initiation and duration of breastfeeding after labor in the study and control group (P<0.01).

Table (6): Illustrates the relationship between personal characteristics, obstetric history of

studied women in the study and control group, and level of pain before the intervention, and reports that there was a highly positive relationship between the level of pain before intervention and educational status, parity, mode of delivery, time of initiation and duration of breastfeeding after labor in the study and control group (P<0.01).

Table (7): Reports relation between personal characteristics, obstetric history of studied women in the study and control group, and breastfeeding before the intervention, and finds that there was a highly positive relation between breastfeeding before intervention and mother's age, parity, gender of the newborn, mode of delivery, time of initiation and duration of breastfeeding after labor in the study and control group (P<0.01).

Table (8): Reveals the relationship between level breast engorgement of studied women and breast feeding in the study and control group before intervention, and illustrates that there was a highly positive relationship between level breast engorgement and breastfeeding before intervention in the study and control group (P<0.01).

Table (1): Personal characteristics of studied women in the study and control group (n=100)

Variable	Study group		Control group		chi-square	
	N(50)	%	N(50)	%	X^2	P-value
Age/ years						
Less than 25 years	11	22.0	9	18.0		
25-<35 years	32	64.0	30	60.0	2.31	**0.316**
35 years or more	7	14.0	11	22.0		
Mean age± SD	**33.2±4.2**		**32.1±3.9**			
Living area						
Urban	19	38.0	21	42.0	0.333	**0.564**
Rural	31	62.0	29	58.0		
Educational status						
No education	5	10.0	6	12.0		
Basic education	8	16.0	10	20.0	0.879	**0.830**
Secondary education	25	50.0	23	46.0		
University or higher	12	24.0	11	22.0		
Occupation						
House wife	36	72.0	38	76.0	0.415	**0.519**
Occupied	14	28.0	12	24.0		

Table (2): Obstetric history of studied women in the study and control group before intervention (n=100)

Variable	Study group		Control group		chi-square	
	N(50)	%	N(50)	%	X^2	P-value
Parity						
Primipara	29	58.0	26	52.0	0.727	**0.394**
Multipara	21	42.0	24	48.0		
Mode of delivery						
Normal delivery	23	46.0	24	48.0	0.39	**0.776**
Cesarean section	27	54.0	26	52.0		
Gender of newborn						
Boy	21	42.0	19	38.0	0.333	**0.564**
Girl	29	58.0	31	62.0		
Number of postpartum days						
3^{th} day	38	76.0	40	80.0	0.466	**0.495**
4^{th} to 5^{th} day	12	24.0	10	20.0		
Time of initiation of breastfeeding after labor						
< 2 hours	2	4.0	1	2.0	1.26	**0.532**
2-5 hour	6	12.0	8	16.0		
More than 5 hour	42	84.0	41	82.0		
Duration of breastfeeding						
< 10 minute	43	86.0	44	88.0		
10-20 minute	5	10.0	4	8.0	0.245	**0.885**
> 20 minute	2	4.0	2	4.0		

Figure (1): Symptoms present in current breast engorgement in the study and control group before intervention (n=100)

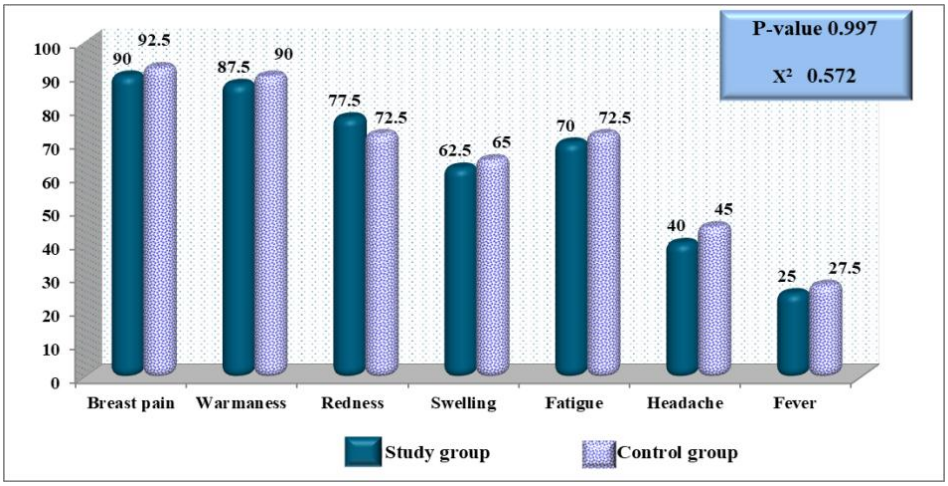


Table (3): Level of breast engorgement in the study and control group before and after intervention (n=100)

Level of breast engorgement	Before intervention				After intervention				Pv1	Pv2
	Study group		Control group		Study group		Control group			
	N(50)	%	N(50)	%	N(50)	%	N(50)	%		
(1) for Soft and no changes in breast	0	0.0	0	0.0	22	44.0	2	4.0	**0.672**	**0.001****
(2) for slight changes in the breast	0	0.0	0	0.0	16	32.0	10	20.0		
(3) for firm and no tender breast	0	0.0	0	0.0	8	16.0	15	30.0		
(4) for firm, and beginning tenderness in breast	15	30.0	16	32.0	4	8.0	12	24.0		
(5) for firm and tender of the breast	21	42.0	18	36.0	0	0.0	7	14.0		
(6) for very firm and very tender	14	28.0	16	32.0	0	0.0	4	8.0		

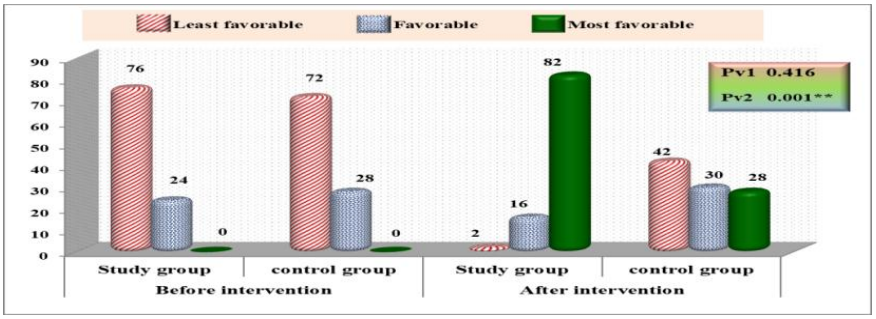
(**) Highly statistical significant difference
Pv1 (between the study and control group before intervention)
Pv2 (between the study and control group after intervention)

Table (4): Level of pain in the study and control group before and after intervention (n=100)

Level of breast engorgement	Before intervention				After intervention				Pv1	Pv2
	Study group		Control group		Study group		Control group			
	N(50)	%	N(50)	%	N(50)	%	N(50)	%		
No pain	0	0.0	0	0.0	34	68.0	8	16.0	**0.484**	**0.001****
Mild pain	2	4.0	4	8.0	13	26.0	11	22.0		
Moderate pain	36	72.0	35	70.0	3	6.0	19	38.0		
Severe pain	12	24.0	11	22.0	0	0.0	12	24.0		

(**) Highly statistical significant difference
Pv1 (between the study and control group before intervention)
Pv2 (between the study and control group after intervention)

Figure (2): Breast feeding LATCH in the study and control group before and after intervention (n=100)



(**) Highly statistical significant difference
Pv1 (between the study and control group before intervention)
Pv2 (between the study and control group after intervention)

Table (5): Relation between personal characteristics, obstetric history of studied women in the study and control group and level of breast engorgement before intervention (n=100)

Items	level of breast engorgement before intervention									
	Study group					Control group				
	level (4) N (15)	level (5) N (21)	level (6) N (14)	Chi square		level (4) N (16)	level (5) N (18)	level (6) N (16)	Chi square	
				X^2	p-value				X^2	p-value
	N (%)	N (%)	N (%)			N (%)	N (%)	N (%)		
Age/ years										
< 25 years	1(6.7)	3(14.3)	7(50.0)			0(0.0)	2(11.1)	7(43.8)		
25-<35 years	11(73.3)	16(76.2)	5(35.7)	65.49	**0.001****	11(68.8)	13(72.2)	7(43.8)	74.13	**0.001****
35years or more	3(20.0)	2(9.5)	2(14.3)			5(31.2)	3(16.7)	2(12.4)		
Living area										
Urban	6(40.0)	7(33.3)	6(42.9)	2.04	0.360	7(43.8)	8(44.4)	6(37.5)	1.2	0.548
Rural	9(60.0)	14(66.7)	8(57.1)			9(56.2)	10(55.6)	10(62.5)		
Educational status										
No education	1(6.7)	1(4.8)	3(21.4)			1(6.3)	2(11.1)	3(18.8)		
Basic education	1(6.7)	3(14.3)	4(28.6)	69.76	**0.001****	2(12.5)	3(16.7)	5(31.2)	38.86	**0.001****
Secondary education	6(40.0)	13(61.9)	6(42.9)			7(43.7)	9(50.0)	7(43.7)		
University or higher	7(46.6)	4(19.0)	1(7.1)			6(37.5)	4(22.2)	1(6.3)		
Occupation										
House wife	10(66.7)	16(76.2)	10(71.4)	2.21	0.331	11(68.8)	15(83.3)	12(75.0)	5.75	0.056
Occupied	5(33.3)	5(23.8)	4(28.6)			5(31.2)	3(16.7)	4(25.0)		
Parity										
Primipara	5(33.3)	13(61.9)	11(78.6)	43.07	**0.001****	4(25.0)	9(50.0)	13(81.2)	63.5	**0.001****
Multipara	10(66.7)	8(38.1)	3(21.4)			12(75.0)	9(50.0)	3(18.8)		
Mode of delivery										
Normal delivery	7(46.6)	12(57.1)	4(28.6)	16.8	**0.001****	12(75.0)	8(44.4)	4(25.0)	50.9	**0.001****
Cesarean section	8(53.4)	9(42.9)	10(71.4)			4(25.0)	10(55.6)	12(75.0		
Gender of newborn										
Boy	6(40.0)	10(47.6)	5(35.7)	3.0	0.223	6(37.5)	6(33.3)	7(43.8)	2.36	0.306
Girl	9(60.0)	11(52.4)	9(64.3)			10(62.5)	12(66.7)	9(56.2)		
Time of initiation of breastfeeding after labor	2(13.3)	0(0.0)	0(0.0)	39.35	**0.001****	1(6.3)	0(0.0)	0(0.0)	23.02	**0.001****
< 2 hours	3(20.0)	2(9.5)	1(7.1)			4(25.0)	2(11.1)	2(12.4)		
2-5 hour	10(66.7)	19(90.5)	13(92.9)			11(68.7)	16(88.9)	14(87.6)		
More than 5 hour										
Duration of breastfeeding	12(80.0)	20(95.2)	11(78.6)			12(75.0)	17(94.4)	15(93.7)		
< 10 minute	1(6.7)	1(4.8)	3(21.4)	43.66	**0.001****	2(12.5)	1(5.6)	1(6.3)	31.31	**0.001****
10-20 minute	2(13.3)	0(0.0)	0(0.0)			2(12.5)	0(0.0)	0(0.0)		
> 20 minute										

(4): For firm, and beginning tenderness in breast
(5): For firm and tender of the breast
(6): For very firm and very tender
(**) Highly statistical significant difference

Table (6): Relation between personal characteristics, obstetric history of studied women in the study and control group and level of pain before intervention (n=100)

Items	level of pain before intervention									
	Study group			Chi square		Control group			Chi square	
	Mild (2)	Moderate (36)	Severe (12)	X^2	p-value	Mild (4)	Moderate (35)	Severe (11)	X^2	p-value
	N (%)	N (%)	N (%)			N (%)	N (%)	N (%)		
Age/ years										
< 25 years	1(50.0)	7(19.4)	3(25.0)	34.9	**0.001****	1(25.0)	6(17.1)	2(18.2)	4.51	0.341
25-<35 years	1(50.0)	24(66.7)	7(58.3)			2(50.0)	22(62.9)	6(54.5)		
35years or more	0(0.0)	5(13.9)	2(16.7)			1(25.0)	7(20.0)	3(27.3)		
Living area										
Urban	1(50.0)	13(36.1)	5(41.7)	4	0.135	2(50.0)	14(40.0)	5(45.5)	2.03	0.363
Rural	1(50.0)	23(63.9)	7(58.3)			2(50.0)	21(60.0)	6(54.5)		
Educational status										
No education	0(0.0)	3(8.3)	2(16.7)			1(25.0)	3(8.6)	2(18.2)		
Basic education	0(0.0)	6(16.7)	2(16.7)	65.06	**0.001****	0(0.0)	6(17.1)	4(36.4)	56.5	**0.001****
Secondary education	1(50.0)	17(47.2)	7(58.3)			2(50.0)	17(48.6)	4(36.4)		
University or higher	1(50.0)	10(27.8)	1(8.3)			1(25.0)	9(25.7)	1(9.0)		
Occupation										
House wife	1(50.0)	27(75.0)	8(66.7)	7.49	**0.023***	3(75.0)	28(80.0)	7(63.6)	7.14	**0.028***
Occupied	1(50.0)	9(25.0)	4(33.3)			1(25.0)	7(20.0)	4(36.4)		
Parity										
Primipara	0(0.0)	19(52.8)	10(83.3)	88.7	**0.001****	1(25.0)	17(48.6)	8(72.7)	45.4	**0.001****
Multipara	2(100.0)	15(47.2)	2(16.7)			3(75.0)	18(51.4)	3(27.3)		
Mode of delivery										
Normal delivery	2(100.0)	20(55.6)	1(8.3)	82.8	**0.001****	3(75.0)	19(54.3)	2(18.2)	66.12	**0.001****
Cesarean section	0(0.0)	16(44.4)	11(91.7)			1(25.0)	16(45.7)	9(81.8)		
Gender of newborn										
Boy	1(50.0)	15(47.2)	5(41.7)	1.43	0.488	1(25.0)	14(40.0)	4(36.4)	5.48	0.064
Girl	1(50.0)	21(52.8)	7(58.3)			3(75.0)	21(60.0)	7(63.6)		
Time of initiation of breastfeeding after labor										
< 2 hours	1(50.0)	1(2.8)	0(0.0)	98.2	**0.001****	1(25.0)	0(0.0)	0(0.0)	99.09	**0.001****
2-5 hour	1(50.0)	5(13.9)	3(25.0)			3(75.0)	4(11.4)	1(9.0)		
More than 5 hour	0(0.0)	30(83.3)	9(75.0)			0(0.0)	31(88.6)	10(91.0)		
Duration of breastfeeding								11(100.0)		
< 10 minute	0(0.0)	33(91.6)	10(83.3)	95.9	**0.001****	0(0.0)	33(85.7)	0(0.0)	99.8	**0.001****
10-20 minute	1(50.0)	2(5.6)	2(16.7)			2(50.0)	2(14.3)	0(0.0)		
> 20 minute	1(50.0)	1(2.8)	0(0.0)			2(50.0)	0(0.0)			

(*) Statistical significant difference
(**) Highly statistical significant difference

Table (7): Relation between personal characteristics, obstetric history of studied women in the study and control group and breast feeding before intervention (n=100)

Items	Breast feeding before intervention							
	Study group				Control group			
	Favorable (12)	Least favorable (38)	Chi square		Favorable (14)	Least favorable (36)	Chi square	
	N (%)	N (%)	X^2	p-value	N (%)	N (%)	X^2	p-value
Age/ years								
< 25 years	0(0.0)	11(28.9)			2(14.3)	7(19.4)		
25-<35 years	7(58.3)	25(65.8)	57.5	**0.001****	4(28.6)	26(72.3)	56.1	**0.001****
35years or more	5(41.7)	2(5.3)			8(57.1)	3(8.3)		
Living area								
Urban	5(41.7)	14(36.8)	0.503	0.478	6(42.9)	15(41.7)	0.029	0.863
Rural	7(58.3)	24(63.2)			8(57.1)	21(58.3)		
Educational status								
No education	1(8.3)	4(10.5)			2(14.3)	4(11.1)		
Basic education	2(16.7)	6(15.8)	0.317	0.957	3(21.4)	7(19.4)	0.730	0.866
Secondary education	6(50.0)	19(50.0)			6(42.9)	17(47.3)		
University or higher	3(25.0)	9(23.7)			3(21.4)	8(22.2)		
Occupation								
House wife	8(66.7)	28(73.7)	1.17	0.280	10(71.4)	28(77.8)	1.08	0.302
Occupied	4(33.3)	10(26.3)			4(28.6)	8(22.2)		

Items	Breast feeding before intervention							
	Study group				Control group			
	Favorable (12)	Least favorable (38)	Chi square		Favorable (14)	Least favorable (36)	Chi square	
	N (%)	N (%)	X^2	p-value	N (%)	N (%)	X^2	p-value
Parity								
Primipara	2(16.7)	27(71.1)	60.08	**0.001****	4(28.6)	18(50.0)	9.59	**0.002****
Multipara	10(83.3)	11(28.9)			10(71.4)	18(50.0)		
Mode of delivery								
Normal delivery	8(66.7)	15(39.5)	14.8	**0.001****	10(71.4)	14(38.9)	21.3	**0.001****
Cesarean section	4(33.3)	23(60.5)			4(28.6)	22(61.1)		
Gender of newborn								
Boy	7(58.3)	14(36.8)	9.26	**0.002****	9(64.3)	10(27.8)	26.8	**0.001****
Girl	5(41.7)	24(63.2)			5(35.7)	26(72.2)		
Time of initiation of breastfeeding after labor								
< 2 hours	2(16.6)	0(0.0)	73.4	**0.001****	1(7.1)	0(0.0)	49.4	**0.001****
2-5 hour	5(41.7)	1(2.6)			6(42.9)	2(5.6)		
More than 5 hour	5(41.7)	37(97.4)			7(50.0)	34(94.4)		
Duration of breastfeeding	6(50.0)	37(97.4)	58.2	**0.001****	8(57.1)	36(100.0)	**54.6**	**0.001****
< 10 minute	4(33.3)	1(2.6)			4(28.6)	0(0.0)		
10-20 minute	2(16.7)	0(0.0)			2(14.3)	0(0.0)		
> 20 minute								

(**) Highly statistical significant difference

Table (8): Relation between level breast engorgement of studied women and breast feeding in the study and control group before intervention (n=100)

Items	Breast feeding before intervention							
	Study group				Control group			
	Favorable (12)	Least favorable (38)	Chi square		Favorable (14)	Least favorable (36)	Chi square	
	N (%)	N (%)	X^2	p-value	N (%)	N (%)	X^2	p-value
Firm, and beginning tenderness in breast	10(83.3)	5(13.3)	**98.8**	**0.001****	11(78.6)	5(13.9)	**91.19**	**0.001****
Firm and tender of the breast	2(16.7)	19(50.0)			3(21.4)	15(41.7)		
Very firm and very tender	0(0.0)	14(36.7)			0(0.0)	16(44.4)		

(**) Highly statistical significant difference

Discussion:

Breast engorgement is a painful tenderness during the early postpartum period that adversely affects breastfeeding **(Sharma, 2018).** Breast engorgement is very common and affects self and newborn care. Reflexology has huge health benefits and it alleviates women's pregnancy and nursing experiences too. Reflexology improves women's health and well-being while also providing a soothing and caring environment for both mother and child **(Loladiya & Lobo, 2019).** The goal of this study was to see how foot reflexology affected nursing mothers' breast engorgement.

There was no statistically significant difference between the study and control groups in terms of breast engorgement level before the intervention, according to the current findings (P>0.05), while after intervention there was a highly statistically significant difference between the study and control group (P<0.01). These findings were in the same line with **(Saini & Kaur, 2017)**, who applied their study in India to identify the effect of cabbage leaves application on breast engorgement among postnatal mothers and reported that there was no statistically significant difference between experimental and control group regarding level of breast engorgement before intervention (P>0.05) that changed to highly statistically significant difference after intervention (P <0.01).

Also **(Kaur & Priyadarshani, 2018),** who carried out their study in India to evaluate the effect of lukewarm water compress on breast engorgement among postpartum mothers, and **(Anandhi, Vahitha, and Sasirekha, 2019),** who achieved their study to compare the socio-demographic variables, maternal and neonatal variables with nipple pain and breast engorgement among postnatal mothers whose babies admitted in nursery, and both studies showed a highly statistically significant difference after intervention between experimental and control group regarding breast engorgement (P<0.01). This similarity explained the vital role of the non-pharmacological method in the management of breast engorgement and supports the importance of its involvement in routine care provided to similar cases.

On the other hand **(El-Saidy & Aboushady, 2016),** implemented their study in Egypt to compare the effect of warm compresses versus cold cabbage leaves on breast engorgement, and revealed that there was no statistically significant difference between the two studied group after intervention. This difference back to comparing two different non-pharmacological methods (warm compresses and cold cabbage leaves) and there was no control group.

Regarding the level of pain in the study and control groups before and after the intervention, current findings illustrate that there was no statistically significant difference between both groups before intervention (P>0.05), while after intervention there was a highly statistically significant difference between study and control group (P<0.01). These findings were in agreement with **(Monazzami et al., 2019),** who conducted research in Iran to compare the effects of hot compresses and hot ginger compresses on breast engorgement related pain and discovered that there was no statistically significant difference between the intervention and control groups before implementation (P >0.05), but there was a highly statistically significant difference after implementation (P <0.01).

Also, **(Anandhi, Vahitha, and Sasirekha, 2019)** and **(El-Saidy & Aboushady, 2016)** showed a highly statistically significant difference between the studied groups regarding pain score after intervention (Pv<0.01). This harmony in the findings explores the relationship between an improvement that occurred after the application of non-pharmacological methods and its effect on enhancing breast engorgement that leads to decreased sensation of pain.

As regards breastfeeding in both groups, actual findings clarify that the majority of studied women in both groups had least favorable breast feeding before intervention with no statistically significant difference between both groups (P>0.05), while after the intervention the majority of studied women in the study group compared by less than one third in the control group had most favorable breastfeeding with highly statistically significant difference between study and control group (P <0.01).

The same opinion of previous findings was reported by **(Abd El-hady et al., 2019),** who applied their study in Egypt to identify self-care practices of primipara women regarding breast engorgement, and reported that near to two-thirds of studied women with breast engorgement had a poor score of LATCH breastfeeding. This may stem from the enrolled women in this study, a pig percent of them were primigravida, with less experience that made them face this problem.

Concerning symptoms of current breast engorgement before the intervention, the present findings illustrate that the majority of studied women in both groups had pain followed by warmness, the majority of them had redness and fatigue in both groups, with no statistically significant difference between both groups (P>0.05). The similar conclusion was reached by **(Sharma, 2018),** who conducted a study to determine the efficacy of chilled cabbage leaf application and heat compression on breast engorgement in terms of symptoms. and showed that the vast majority of studied women before intervention had pain and the majority of them had redness and fatigue with no statistically significant difference between both groups (P>0.05).

And **(El-Saidy & Aboushady, 2016)** illustrated that the most common frequent symptom of breast engorgement was pain and the majority of studied women had redness and

fatigue. Also **(Hassan et al., 2019),** performed their study in Egypt to evaluate the impact of nursing intervention on the relief of breast engorgement among women with cesarean section, and demonstrated that the vast majority of studied women with breast engorgement had a pain as a main symptom. This similarity proved that pain was the main complaint of women with breast engorgement.

Referring to the association between personal characteristics, obstetric history of studied women in the study and control group and degree of breast engorgement before intervention, current findings reveal that there was a highly positive relationship between the level of pain before intervention and mother's age, educational status, parity, mode of delivery, time of initiation and duration of breastfeeding after labor group ($p<0.01$). **Abd El-Hady et al., 2019** agreed with the previous result as it showed a favorable link between the level of breast engorgement and educational level. Also **(Hassan et al., 2019), and (Elzeblawy et al., 2019)** who conducted research in Egypt to assess breastfeeding knowledge and behaviors among primiparous women who had a caesarean section, as well as the influence on breast engorgement, both of them reported a positive relationship between the level of breast engorgement and mother's age and educational status. This reflects that mother's level of education act a vital role in knowledge and prevention of breast engorgement.

Furthermore, in both the research and control groups, there was a positive association between breast engorgement and breastfeeding ($p<0.01$). the same opinion was reported by **(Loladiya & Lobo, 2019)** and **(El-Saidy & Aboushady, 2016).**

Regarding the relationship between personal characteristics, obstetric history of studied women in the study and control group and level of pain before intervention, Actual findings demonstrate a strong link between pre-intervention pain levels and educational status, parity, mode of delivery, and the start and duration of lactation following labor ($p<0.01$). Similar findings were reported by **(Anandhi, Vahitha, and Sasirekha, 2019),** who found that there was a positive relationship between the level of pain and mode of delivery, and the time of initiation of breastfeeding after labor. This supports the importance of early and regular breastfeeding to reduce the risk for breast engorgement followed by reduced breast pain.

As regards the relationship between personal characteristics, obstetric history of studied women in the study and control group and breast feeding LATCH before intervention, the current findings show a highly positive relation between breast feeding LATCH and mother's age, parity, mode of delivery, gender, time of initiation and duration of breastfeeding after labor ($p<0.01$). These results were in the same line as those **(Abbas & Hassan, 2015),** who applied their study in Baghdad to assess the LATCH score regarding breastfeeding among the study sample and to identify the problems related to breastfeeding among the study sample, and reported that there was relationship between LATCH breastfeeding and mother age and no relation with educational level.

Also **(Abd El-hady et al., 2019)** reported a positive relation between LATCH breastfeeding and mother age. From the researcher's point of view, women's age act as a vital factor that affected breastfeeding, as women's age progress this enhances their experience and encourages them to tend to initiate breastfeeding early and regularly.

Conclusion:

Based on the findings of the present study, foot reflexology was found to be an efficient non-pharmacological approach in the management of breast engorgement.

Recommendations:

- Planning and developing antenatal classes for all women to increase their knowledge and enhance their self-care practices regarding foot reflexology as a method to manage breast engorgement.
- The curricula of basic nursing education, as well as continuing education, should entail foot reflexology as non-pharmacological management of breast engorgement.
- Implement in-service training for the nurses, especially on using the foot reflexology as a method to manage breast engorgement.

- A similar study can be undertaken with a large sample to generalize the findings.
- Supported mothers with an instructional booklet regarding foot reflexology as a method to manage breast engorgement to improve their knowledge and practices regarding it.

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