

Effect of Nursing Interventions Strategies for Inverted Nipple on Efficiency of Early Breastfeeding among Primiparous Mothers

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Abstract

Background: The inverted nipple is the most encountered problem that leads to difficulties with breastfeeding; it is an indicator of serious breast issue. Many strategies have been proposed to manage the inverted nipple. **The aim of this study:** was to assess the effect of nursing interventions strategies for inverted nipple on efficiency of early breastfeeding among primiparous mothers. **Subjects and Method:** Quasi experimental research design was used to conduct this study at postnatal ward of Tanta University and El-Menshawey Hospitals. The study sample consisted of 100 primiparous mothers with inverted nipple, **Group (1):** 50 primiparous mothers used syringe technique. **Group (2):** 50 primiparous mothers used Hoffman's exercise. Data collection was conducted using **three tools, Tool I:** Mothers' knowledge regarding inverted nipple structured questionnaire, **Tool II:** LATCH assessment scale and **Tool III:** Infant breastfeeding assessment tool (IBFAT). **Results:** There was a significant statistical improvement in the overall knowledge, LATCH, and IBFAT in Hoffman and syringe groups after implementation of nursing intervention strategies. Additionally, there were positive correlation between the studied primiparous mothers' total score level of knowledge, total LATCH and their total infant breastfeeding in Hoffman and syringe groups' pre-intervention, the end of 1st week after delivery and the end of the postpartum period. **Conclusion:** The findings of the present study revealed significant improvement in the mothers' knowledge, LATCH, and level of IBFAT in Hoffman and syringe groups after implementation of nursing intervention strategies. **Recommendation:** It is recommended to develop training programs for mothers in order to improve their knowledge and practices regarding inverted nipple.

Keywords: Breastfeeding, Inverted Nipple, Nursing Interventions & Primiparous Mothers

Introduction

Breastfeeding is fundamental to the well-being of both mother and child. Unfortunately, breast problems experienced by mothers during breastfeeding are common cause of premature weaning. (WHO, 2018; American Academy of Pediatrics, 2021). An inverted nipple is one of breast problem that responsible for stopping breastfeeding. Inverted nipple also called retracted nipple or shy nipple is a condition where the nipple is retracted inwards or turned in on itself, rather than pointing outwards, as is seen in common or typical anatomy. It can happen in both sexes. However, many women not talked about this condition because it is classified as taboo (Olivas-Menayo & Berniz 2021). Although inverted nipple is not life-threatening, it is psychologically and physiologically damaging to the women, it causes cosmetically problem where the appearance is undesired, as well as it cause problems during breastfeeding (Abdulkareem, et al., 2023).

Inverted nipples, a condition where the nipple turns inward, are categorized into three levels of severity based on the ease of manual retraction and the extent of tissue hardening (fibrosis) behind the nipple. Grade 1 inverted nipples exhibit minimal fibrosis and can be easily pulled outward while maintaining their projected position. Grade 2 involves moderate fibrosis and, although the nipple

can be manually retracted, it fails to stay projected. Grade 3 presents with severe fibrosis and inward retraction, making manual retraction impossible. (Waleed, et al., 2018). Causes of inverted nipple may be congenital or acquired. Congenital occur in about 10-20% of all women. Woman born with this condition caused by short ducts or a wide areola muscle. While acquired inverted nipple include post traumatic with subsequent fat necrosis, post breast surgery, chronic inflammation such as mammary duct ectasia, chronic breast abscess or tuberculosis and, breast cancer and rapid weight loss (Dos-Santos, & Ruiz-Castilla, 2024).

Treatment for inverted nipples includes surgical and non-surgical treatment. Management depends on the grade of inverted nipple. Nipple correction surgery is the solution for most women with grade 2 or 3 inverted nipples that are not amenable to manual extraction. The surgery is beneficial for increase the women's self-esteem and confidence improve their ability to breastfeed the infants (Thurkkada et al., 2023). The surgery is quick, straightforward, doesn't require multiple incisions or bulky dressings, and is associated with minimal scarring. Surgical treatments include: **nipple piercing** which involves piercing the nipple, which can help to break up the tissue that is causing the inversion, **dermal grafting** that involves grafting skin from another part of the body onto the nipple

to help it protrude outward and **division of ducts** which involves dividing the milk ducts that are causing the nipple to invert (Sun et al., 2024).

Non-surgical treatment includes Hoffman's exercise, syringe technique; various non-surgical devices are available to address inverted nipples, a condition that can make breastfeeding difficult. These include Niplettes, which use gentle suction to draw out the nipple, and nipple shields, soft covers worn during breastfeeding to extend nipple length. Breast shells, made of rigid plastic, apply pressure to the nipple between feedings, encouraging protrusion. While these methods are user-friendly and affordable, they can lead to complications such as nipple infection, bleeding, or accidental ingestion of device components by the infant. (Nabulsi, et al., 2022). Despite the fact that inverted nipples is a stressful problem and affect the health of the infant, pregnant women may not seek for treatment due to embarrassment and lack of sufficient knowledge among the affected women. The nurse as an important professional person in the health care provider which provide health education to the women about importance of antenatal care for early detection of any breast problem during pregnancy and provide emotional support for women to express their fears and worries (Kim 2024).

Significance of the study:

Breastfeeding is essential for the survival, nutrition, development of children and maternal health. Inverted nipples are common condition that can affect the breast. It is does not pose any significant health risks. However, while these interventions are user-friendly and affordable, they carry potential risks such as nipple infection, bleeding, and accidental ingestion of device components by the infant. (Khatib et al., 2023).

The inverted nipple is present in 3% of females, with bilateral involvement in 86.8% of affected women. The higher incidence occurs in pregnant women by rate 9.8%. Inverted nipples pose both functional and aesthetic challenges. Functionally, they can hinder breastfeeding and proper breast hygiene, contributing to inadequate nutrition and increased child mortality rates globally. Aesthetically, inverted nipples can cause psychological distress in women due to their abnormal appearance. (Wang, et al., 2023).

Despite various corrective techniques being available, none have proven consistently effective or durable, often resulting in unsatisfactory outcomes, recurrence, and multiple scars. This highlights the need for a reliable and lasting solution. The present study proposes a straightforward, reproducible technique for correcting inverted nipples that minimizes scarring and offers long-term results. The purpose of this study is to describe nursing intervention stratagems and its applications. (Ma, et al., 2022). Thus, it

becomes an increasingly vital to educate the women about nursing intervention strategies for inverted nipple, this empowers the mother to seek health care. So, the aim of the current study was to assess the effect of nursing interventions strategies for inverted nipple on efficiency of early breastfeeding among primiparous mothers.

Aim of the study:

The aim of this study was to assess the effect of nursing interventions strategies for inverted nipple on efficiency of early breastfeeding among primiparous mothers.

Research hypotheses:

1. The severity of inverted nipple was expected to be improved after implementation of the nursing interventions strategies.
2. The infant was expected to exhibit early successful initiation of breastfeeding and good latch on.

Subjects and Method

Research design: Quasi experimental research design was used to conduct this study.

Settings:

This study was conducted at postnatal ward of:

- Tanta University hospital affiliated to Ministry of Higher Education and scientific research.
- El-Menshaway hospital affiliated to Ministry of Health and population.

Subjects:

A purposive sample of 100 primiparous mothers with inverted nipple was selected from the previously mentioned settings.

They were divided alternatively and equally into two groups:

Group (1): comprised of 50 primiparous mothers who use syringe technique.

Group (2): comprised of 50 primiparous mothers who use Hoffman's exercise.

The subjects of this study were selected according to the following inclusion criteria:

- Primiparous woman.
- Gestational age at 37 – 42 weeks.
- Mothers who had at least one inverted nipple with grades 1 or 2.
- Single fetus.
- Mothers who intending to breast feed her infant.
- Mothers without medical conditions that interfere with breastfeeding.
- Absence of neonatal congenital anomalies as tongue tie, cleft lip and cleft palate.

The necessary sample size was determined using Epi-Info, a statistical software package developed by the World Health Organization and the Centers for Disease Control and Prevention in Atlanta, Georgia, USA. This specific version of the software dates back to 2002.

The criteria used for sample size calculation were as follow:

- 95 % confidence limit.
- 80% power of the study.

- Expected outcome 90% after intervention compared to 65% before intervention.

$$n = \frac{\left(\frac{z}{d}\right)^2 \times (0.50)^2}{1 + \frac{1}{N} \left[\left(\frac{z}{d}\right)^2 \times (0.50)^2 - 1\right]}$$

Where n = Community size, Z = the standard score corresponding to the significance level is 0.95 and is equal to 1.96 and D = mistake percentage.

Tools of data collection:

To achieve the aim of this study, three tools were developed and used for data collection:

Tool I: Primiparous mothers' knowledge regarding inverted nipple structured questionnaire:

It was developed by the researchers after reviewing the recent related literatures (Bardwal 2020; Ahmed, et al., 2023; Dos-Santos, & Ruiz-Castilla, 2024) to collect the basic data regarding the study subjects. It included three parts as follows:

A. Part one: Socio-demographic characteristics of the primiparous mothers: This part developed to collect data about general characteristics of the study subjects which included: age, current marital status, age at marriage, education, occupation, residence, telephone number, family income from mothers' perspective, and type of family.

B. Part two: Obstetrical history included: gravidity, last menstrual period, expected date of delivery, gestational weeks, number of abortions, time of the initial antenatal visit, place of antenatal visit, number of antenatal visits, and attendance of antenatal care classes,

mode of delivery, presence of pregnancy and delivery complications.

C. Part three: primiparous mothers' knowledge regarding inverted nipple: This part was developed to assess mothers' knowledge regarding inverted nipple which included definition, risk factors, grades, complication, prevention, management and source of knowledge of inverted nipple.

The scoring system for mothers' knowledge was categorized as follows:

- Correct and complete answers were scored as (2 marks).
- Correct and incomplete answers were scored as (1 mark).
- Incorrect and didn't know were scored as (Zero).

The total score level of mothers' knowledge was calculated by (6 questions x 2 = 12). Then, it was categorized as follows:

- High level of knowledge ≥ 75%= (10-12 marks).
- Moderate level of knowledge 60 % - <75%= (8-9 marks).
- Low level of knowledge <60% = (0-7 marks).

Tool II: LATCH assessment scale:

It was adopted from (Jensen, et al., 1994; Rapheal, et al., & Ramakrishnan, 2023). It was used to determine the efficiency of early breastfeeding. The acronym LATCH is used to categorize key aspects of breastfeeding assessment. Each letter corresponds to a specific area: L represents latch, A signifies audible swallowing, T denotes nipple type, C stands for maternal comfort level, and H indicates the amount of assistance required for proper infant positioning. The scale assigned a numerical score (0, 1, 2) for five key components and was visually represented in the same form as the Apgar scoring grid

LATCH scale		0	1	2
L	Latch	- Too sleepy or reluctant. No latch achieved.	- Repeated attempts to hold nipple in mouth.	- Grasps breast (tongue down, lips flanged and rhythmic sucking).
A	Audible swallow or palpable swallow	- None.	- A few with stimulation.	- Spontaneous and frequent.
T	Type of nipple	- Inverted nipple.	- Flat/Very short nipple.	- Everted after stimulation.
C	Comfort (Breast/Nipple)	- Engorged, cracked, bleeding, large blisters or bruises. - Severe discomfort.	- Filling Reddened/small blisters or bruises. - Mild/moderate discomfort	- Soft Non-tender or slight discomfort
H	Hold (positioning)	Need full assist (staff hold infant to breast).	Minimal assist.	- No assist from staff (mother able to position and hold infant).

The total score level of LATCH was categorized as follows:

- Good breastfeeding → (8-10)
- Fair breastfeeding → (4-7)
- Poor breastfeeding → (0-3)

Tool III: Infant breastfeeding assessment tool (IBFAT):

The IBFAT was adopted from (Mathews 1988; Tomita, Tahara-Sasagawa, Yonezawa, Usui, & Haruna, 2023). It was used to assess infant

breastfeeding behavior. It was consisted of four components: readiness of the infant to feed, rooting, fixing and sucking. Each component is assigned a numerical value of (0, 1, 2, 3) based on the answer chosen.

The scoring system for infant breastfeeding assessment was categorized as follows:

- Very pleased = 3
- Pleasured = 2
- Fairly pleased = 1
- Not pleased = 0

Infant breastfeeding assessment tool (IBFAT)	Very pleased (3)	Pleased (2)	Fairly pleased (1)	Not pleased (0)
Readiness of the infant to feed:	Placed the baby on the breast as no effort was needed.	Used mild stimulation such as unbundling, patting or burping.	Unbundled baby, sat baby back and forward, rubbed baby's body or limbs vigorously at beginning and during the feeding.	Could not be aroused.
Rooting	Rooted effectively at once.	Needed coaxing, prompting or encouragement.	Rooted poorly even with coaxing.	Did not root.
Fixing: How long from placing baby on the breast to latch and suck?	0 - 3 minutes.	3- 10 minutes.	Over 10 minutes.	Did not feed.
Sucking pattern	Sucked well throughout on one or both breasts.	Sucked on and off but needed encouragement.	Sucked poorly, weak and for short periods.	Did not suck.

The total score level of infant breastfeeding was categorized as follows:

- Effective breastfeeding → (10-12)
- Moderate effectiveness of breastfeeding → (7-9)
- Non effective breastfeeding → (0-6)

Method

Official approval: to ensure the study's legitimacy, an official letter outlining the study's purpose was obtained from the Faculty of Nursing at Tanta University and submitted to the administrators of obstetric and gynecological departments at the two settings (Tanta University Hospital and El-Menshaway Hospital) to obtain their approval and cooperation for conducting the study.

Ethical considerations in the form of maintaining privacy, confidentiality of the collected data, the ability of the studied mothers to withdraw from the study at any time and the data was solely used for the purpose of the present study were thoroughly taken into account throughout the study. Plus Obtaining the Ethical approval from the Scientific Research Ethical Committee of Faculty of Nursing, Tanta University before starting the study (Ethical Code: 319-10-2023).

The study tool I was developed by the researcher after reviewing the recent related literature (Bardwal 2020; Ahmed, Mohamed, & Heiba, 2023; Dos-Santos, & Ruiz-Castilla, 2024) and tools (II and III) were adopted from (Jensen D et al., 1994; Rapheal et al., 2023 and Mathews 1988; Tomita et al., 2023) respectively after reviewing the recent related literature.

Validity and reliability of the study tools:

The face and content validity of the study tools were assessed through a jury test conducted by five experts in the field of Maternal and Neonatal Health Nursing. This evaluation aimed to determine the relevance and appropriateness of both individual items and the entire instrument in measuring the desired outcomes. The questionnaire's face validity was determined to be 93.16% based on expert opinions, while the content validity index (%) for its items was 80.7% for knowledge. In terms of reliability, the questionnaire was tested among pilot subjects, and Cronbach's Alpha coefficients were

calculated. The values obtained were 0.810 for knowledge.

Pilot Study: A preliminary study involving a small subset of participants 10% (10 mothers, equally divided between two groups) was conducted to evaluate the practicality and suitability of the research tools. This pilot phase aimed to identify any ambiguities in the questionnaire wording that could potentially hinder data collection. The findings from this pilot study were incorporated into the main dataset as no significant modifications to the tools were deemed necessary.

Study Timeline: Data collection for the main study took place over a period of eight months, spanning from October 2023 to May 2024. Researchers visited pre-selected locations three days per week until the target sample size was reached.

Nursing interventions strategies for inverted nipples were carried out in four phases: assessment, planning, implementation, and evaluation.

Assessment phase:

This phase was done before applying the nursing interventions strategies. The researchers met with the mothers immediately after delivery at the postnatal ward during the morning and the afternoon shifts at the previously mentioned settings. Potential participants were invited to join the study after being informed about its objectives. All mothers in both groups completed a structured questionnaire through individual interviews, lasting approximately 10 to 15 minutes each. This pre-test questionnaire was administered at the outset of the study.

The researcher used: **Tool I: Mothers' knowledge regarding inverted nipple structured questionnaire: part (1):** socio-demographic characteristics of the studied mothers, **part (2):** obstetric history of the mothers and **part (3):** primiparous mother's knowledge regarding inverted nipple was used to assess mothers' knowledge regarding inverted nipple before applying the nursing intervention strategies.

Tool II: LATCH assessment scale: It was used to determine the efficiency of early breastfeeding.

Tool III: Infant breastfeeding assessment tool (IBFAT): It was used to assess infant breastfeeding behavior.

Planning phase:

Setting the goals and objectives of the nursing interventions strategies:

The goals of the nursing interventions strategies were to:

- Reduce the severity of inverted nipple.
- Enhance early successful initiation of breastfeeding and good infant latch on.

Objectives of the nursing interventions:

- Assess the effect of nursing interventions strategies for inverted nipple on efficiency of early breastfeeding.
- Determine the severity of inverted nipple in two groups before and after the nursing interventions strategies.

Preparation of the educational colored booklet:

Based on the assessment phase the content developed by the researchers and distributed to the mothers to increase their knowledge and quality of practice regarding inverted nipple. Various teaching methods, power-point, demonstrations and re-demonstrations, were prepared for the mothers, along with instructional materials as posters, videos and pictures. The content was presented in two sessions, either individually or in groups, with a range of 8 to 10 participants. These sessions included one theoretical and one practical session. Each session lasted between 30 and 45 minutes, with time allocated for discussion.

Implementation phase:

Syringe technique group:

The first session (theoretical session): The aim of this session was to explain the goal and objective of the nursing interventions strategies and also provide the mothers with knowledge regarding inverted nipple which included definition, risk factors, grades, complications as well as management of inverted nipple.

The second session (practical session): The aim of this session was to provide health education about the management of inverted nipple with syringe technique. The group was given instructions about syringe technique: using 10cm disposable syringe, first trim the nozzle tip and then insert the plunger through the opening created. Position the smooth end of the plunger against the moistened nipple, ensuring proper lubrication prior to use. Gently withdraw the plunger for duration of 30 seconds to one minute and repeat this technique several times throughout the day. This action generates negative pressure, effectively drawing out the nipple. Ask the mothers to do this technique before feeding their infants. **Fig (1)**

- Each session commenced with providing feedback and demonstrating again the content from the previous session, followed by an introduction to the objectives of the new session.

- After the sessions illustrated colored brochure was given to the studied mothers to be used as guide for them.

Hoffman's exercise group:

The first session (theoretical session): The aim of this session was to explain the goal and objective of the nursing interventions strategies and also provide the mothers with knowledge regarding inverted nipple which included definition, risk factors, grades, complications as well as management of inverted nipple.

The second session (practical session): The aim of this session was to provide health education about the management of inverted nipple with Hoffman's exercise. The group was given instructions about Hoffman's exercise. The mothers were asked to place thumbs on either side of the base of the nipple not the outside of the areola, then press firmly into breast tissue, while still pressing down gently pull thumbs away from each other. It was repeated five times a day in the horizontal plane (at 3 and 9 o'clock) and then five times in the vertical plane (at 12 and 6 o'clock). **Fig (2)**

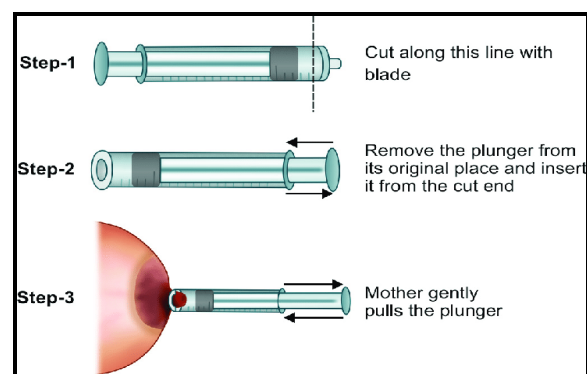


Fig (1): Syringe technique

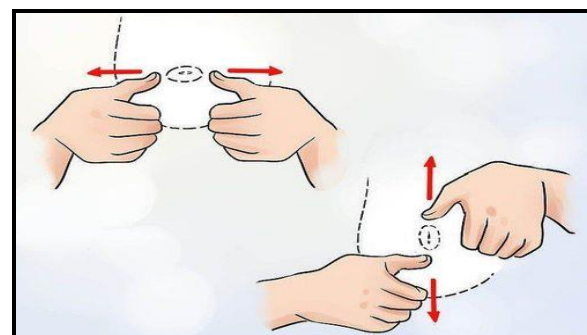


Fig (2): Hoffman's exercise

Source: Meek, J. (2017). *The American Academy of Pediatrics New Mother's Guide to Breastfeeding (Revised Edition): Completely Revised and Updated Third Edition*. Bantam

Each session commenced with providing feedback and demonstrating again the content from the previous session, followed by an introduction to the objectives of the new session.

Evaluation Phase:

Mothers with inverted nipple were re-assessed twice after perform the nursing interventions strategies in the two groups. The first evaluation was done at the end of 1st week after delivery, while the second evaluation was done at the end of the postpartum period by using **tool I part (3)**: Primiparous mother's knowledge regarding inverted nipple.

Tool II: LATCH assessment scale to determine the efficiency of early breastfeeding.

Tool III: Infant breastfeeding assessment tool to assess infant breastfeeding behavior.

Statistical analysis:

Data Analysis: The collected data underwent a comprehensive analysis process. This involved coding, entry into a database, tabulation, and statistical analysis utilizing SPSS software (version 25).

Quantitative data were summarized using range, mean, and standard deviation calculations. Qualitative data, characterized by categorical

variables expressed as frequencies, percentages, or proportions, were compared between two or more groups using the Chi-square test.

For comparison between related more than two means of non-parametric data (before intervention, the end of 1st week after delivery and at the end of the postpartum period), Friedman Test (χ^2 value) was calculated .

For non-parametric data from independent samples, comparison of means between two groups was conducted using the Mann-Whitney U test (Z value). When comparing means across three or more groups, the Kruskal-Wallis test (Chi-square value) was employed. Correlation analysis between variables was performed using Pearson's correlation coefficient (r).

Limitation of the study

Waiting for mothers until finish their postnatal follow up.

Results

Table (1): Distribution of the studied primiparous mothers according to their socio-demographic characteristics (n=100).

Socio-demographic characteristics	Studied Primiparous Mothers				Chi square test	
	Hoffman's exercise group		Syringe technique group		X ²	P-value
	N	%	N	%		
Age /years						
18-<20	9	18.0	3	6.0	4.661	0.097
20-<25	15	30.0	12	24.0		
More than 25	26	52.0	35	70.0		
Range	19-27		18-32			
(Mean±SD)	22.4±3.12		23.07±2.48			
Marital status						
Married	49	98.0	48	96.0	3.293	0.193
Divorced	0	0.0	2	4.0		
Widowed	1	2.0	0	0.0		
Age at marriage						
<20	8	16.0	10	20.0	0.277	0.870
20-<30	28	56.0	27	54.0		
More than 30	14	28.0	13	26.0		
Range	18-32		20-34			
(Mean±SD)	23.41±4.16		24.12±3.95			
Level of education						
Illiterate	3	6.0	3	6.0	1.877	0.758
Read and Write	8	16.0	11	22.0		
Primary school	2	4.0	5	10.0		
Secondary school	30	60.0	26	52.0		
University	7	14.0	5	10.0		
Occupation						
Working	7	14.0	10	20.0	0.638	0.424
House wife	43	86.0	40	80.0		
Residence						
Urban	38	76.0	33	66.0	1.214	0.271
Rural	12	24.0	17	34.0		
Family income from mothers' view						
More than enough	1	2.0	2	4.0	2.950	0.229
Enough	34	68.0	40	80.0		
Not enough	15	30.0	8	16.0		
Type of family						
Nuclear	12	24.0	9	18.0	0.932	0.334
Extended	38	76.0	41	82.0		

*Statistically significant ($P < 0.05$)

Table (2): Distribution of the studied primiparous mothers according to their obstetric history

Obstetrical history of the mothers	Studied Primiparous Mothers				Chi square test	
	Hoffman's exercise		Syringe technique		X ²	P-value
	N	%	N	%		
Gravidity						
1	45	90.0	47	94.0		
2	4	8.0	2	4.0		
3	1	2.0	1	2.0	1.253	0.740
Gestational weeks						
Range	37-42		38-42			
Mean±SD	38.25±1.30		39.32±1.41			
Abortion						
Yes	5	10.0	3	6.0		
No	45	90.0	47	94.0		
If yes, number of abortion	(n=5)		(n=3)			
1	4	80.0	2	66.6	3.763	0.152
2	1	20.0	1	33.4		
Attendance of antenatal care visit						
Yes	47	94.0	50	100.0	3.093	0.079
No	3	6.0	0	0.0		
Time of the initial antenatal care visit						
First trimester	34	68.0	29	58.0		
Second trimester	13	26.0	16	32.0	3.501	0.174
Third trimester	3	6.0	5	10.0		
Place of antenatal care visit						
Government hospital	3	6.0	2	4.0		
Private hospital	0	0.0	2	4.0	4.985	0.173
Private clinic	37	74.0	29	58.0		
Maternal and child health care	10	20.0	17	34.0		
Number of antenatal care visits						
1	11	22.0	10	20.0		
2	25	50.0	29	58.0	2.534	0.469
3	13	26.0	8	16.0		
4	1	2.0	3	6.0		
Attendance of antenatal care classes						
Yes	4	8.0	1	2.0		
No	46	92.0	49	98.0	4.167	0.041*
If yes, who is giving the course?	(n=4)		(n=1)			
Doctor	1	25.0	1	100.0		
Nurse	3	75.0	0	0.0		
Mode of delivery						
Normal vaginal delivery	7	14.0	8	16.0		
Cesarean section	43	86.0	42	84.0	0.078	0.779
Previous pregnancy complications						
Yes	3	6.0	6	12.0	1.099	0.295
No	47	94.0	44	88.0		
If yes, mention the complications?	(n=3)		(n=6)			
Pre-eclampsia	2	66.7	3	50.0		
Placenta previa	1	33.3	1	16.7	1.350	0.509
PROM	0	0.0	2	33.3		
Complications during labor						
Yes	1	2.0	5	10.0		
No	49	98.0	45	90.0	2.837	0.092
If yes, mention the complications?	(n=1)		(n=4)			
Intrapartum hemorrhage.	0	0.0	2	40.0		
Fetal distress	1	100.0	2	40.0	1.200	0.549
Umbilical cord prolapse	0	0.0	1	20.0		

Table (3): Distribution of the studied primiparous mothers' according to their knowledge regarding inverted nipple (N= 100).

Mothers' knowledge regarding inverted nipple	Studied Primiparous Mothers												Chi-square	
	Hoffman's exercise group						Syringe technique group						X ²	P-value
	Incorrect		Correct and incomplete		Incorrect		Incorrect		Correct and incomplete		Incorrect			
	N	%	N	%	N	%	N	%	N	%	N	%		
Definition of inverted nipple														
Pre intervention	26	52	20	40	4	8	31	62	17	34	2	4	1.349	0.510
End of 1 st week after delivery	6	12	7	14	37	74	3	6	4	8	43	86	2.268	0.322
End of the postpartum period	4	8	11	22	35	70	5	10	5	10	40	80	2.694	0.260
The risk factors of inverted nipple														
Pre intervention	27	54	19	38	4	8	31	62	18	36	1	2	2.103	0.349
1 st week after delivery	3	6	7	14	40	80	3	6	3	6	44	88	1.790	0.409
End of the postpartum period	2	4	9	18	39	78	3	6	8	16	39	78	0.259	0.879
Grades of inverted nipple														
Pre intervention	24	48	22	44	4	8	29	58	17	34	4	8	1.113	0.573
End of 1 st week after delivery	4	8	6	12	40	80	3	6	2	4	45	90	2.437	0.296
End of the postpartum period	3	6	8	16	39	78	4	8	5	10	41	82	0.885	0.642
Complications of inverted nipple														
Pre intervention	30	60	17	34	3	6	27	54	21	42	2	4	0.779	0.677
End of 1 st week after delivery	6	12	5	10	39	78	3	6	2	4	45	90	2.714	0.257
End of the postpartum period	4	8	12	24	34	68	4	8	7	14	39	78	1.658	0.436
Prevention of inverted nipple														
Pre intervention	28	56	14	28	8	16	28	56	16	32	6	12	0.419	0.811
End of 1 st week after delivery	2	4	4	8	44	88	3	6	2	4	45	90	0.878	0.645
End of the postpartum period	1	2	9	18	40	80	5	10	6	12	39	78	3.279	0.194
Medical management of mothers with inverted nipple														
Pre intervention	23	46	15	30	12	24	30	60	19	38	1	2	10.703	0.005*
End of 1 st week after delivery	5	10	3	6	42	84	4	8	1	2	45	90	1.215	0.545
End of the postpartum period	4	8	11	22	35	70	3	6	4	8	43	86	4.230	0.121

*Statistically significant ($P < 0.05$)

Table (4): Distribution of the studied primiparous mothers' according to their total mean level of knowledge regarding inverted nipple (N= 100).

Total knowledge score	Hoffman's exercise group		Syringe technique group	
	Mean	SD	Mean	SD
Pre intervention	3.54	1.13	3.42	1.76
End of 1 st week after delivery	9.24	1.27	9.12	1.32
End of the postpartum period	8.86	1.39	8.38	1.19

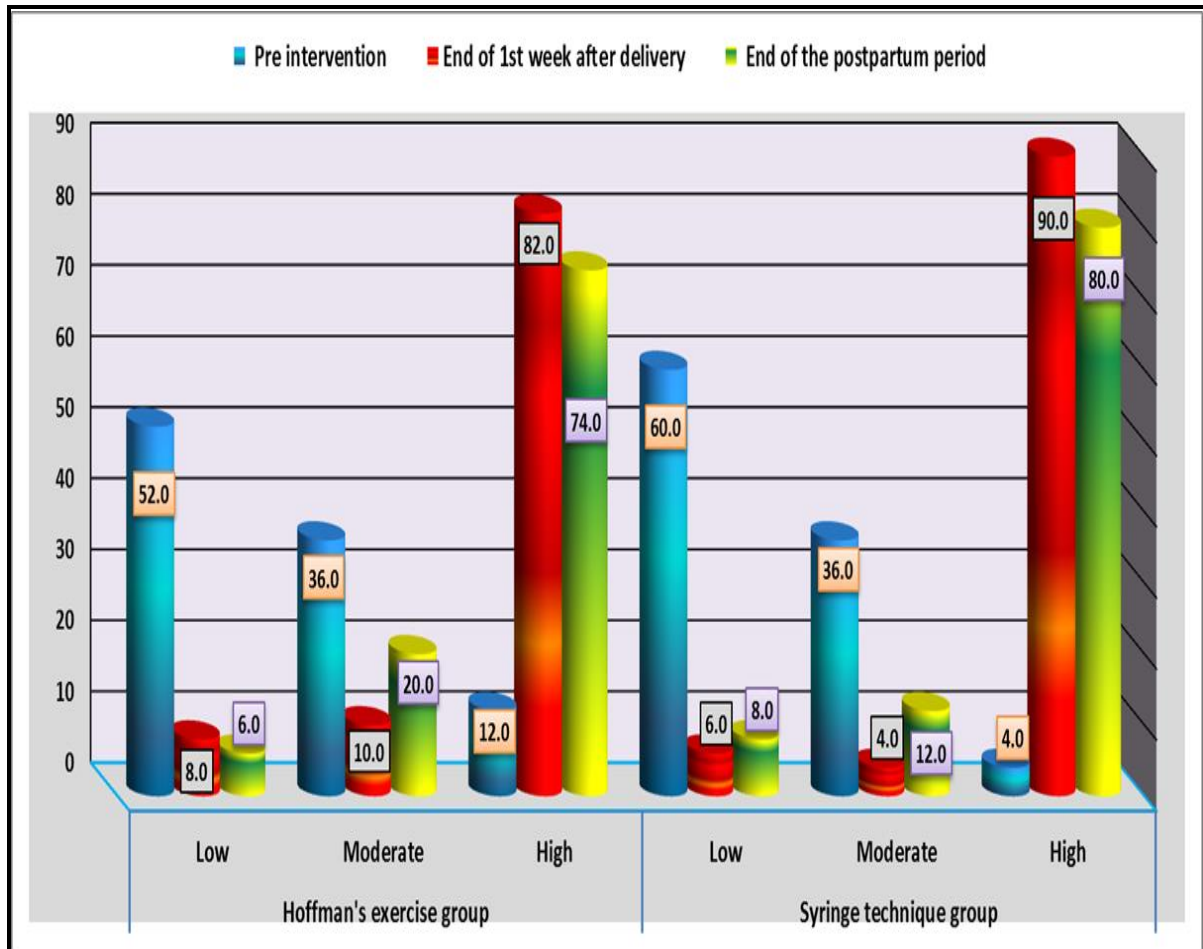


Figure (1): Distribution of the studied primiparous mothers' according to their total score level of knowledge regarding inverted nipple (N= 100)

Table (5): Distribution of the studied primiparous mothers' according to their Level of LATCH (N= 100).

Level of LATCH	Studied Primiparous Mothers												Chi-square		
	Hoffman's exercise group						Syringe technique group						X ²	P-value	
	0		1		2		0		1		2				
	N	%	N	%	N	%	N	%	N	%	N	%			
Latch															
Pre intervention	28	56	15	30	7	14	32	64	11	22	7	14		0.882	0.643
End of 1 st week after delivery	5	10	20	40	25	50	9	18	10	20	31	62		5.119	0.077
End of the postpartum period	2	4	11	22	37	74	1	2	4	8	45	90		4.380	0.112
Audible swallow															
Pre intervention	24	48	16	32	10	20	20	40	11	22	19	38		4.083	0.130
1 st week after delivery	11	22	15	30	24	48	6	12	18	36	26	52		1.823	0.402
End of the postpartum period	5	10	8	16	37	74	0	0	9	18	41	82		5.264	0.072
Type of nipple															
Pre intervention	29	58	11	22	10	20	27	54	11	22	12	24		0.253	0.881
End of 1 st week after delivery	8	16	14	28	28	56	7	14	12	24	31	62		0.373	0.830
End of the postpartum period	2	4	10	20	38	76	2	4	4	8	44	88		3.010	0.222
Comfort (Breast/Nipple)															
Pre intervention	25	50	14	28	11	22	29	58	13	26	8	16		0.807	0.668
End of 1 st week after delivery	12	24	15	30	23	46	5	10	15	30	30	60		3.807	0.149
End of the postpartum period	1	2	10	20	39	78	2	4	7	14	41	82		0.913	0.634
Hold (positioning)															
Pre intervention	20	40	11	22	19	38	26	52	13	26	11	22		3.083	0.214
End of 1 st week after delivery	6	12	18	36	26	52	10	20	15	30	25	50		1.292	0.524
End of the postpartum period	7	14	2	4	41	82	0	0	4	8	46	92		7.954	0.019*

*Statistically significant ($P < 0.05$)

Table (6): Distribution of the studied primiparous mothers' according to their total mean level of LATCH (N= 100).

Total LATCH score	Hoffman's exercise group		Syringe technique group	
	Mean	SD	Mean	SD
Pre intervention	2.72	1.59	3.38	1.18
End of 1 st week after delivery	6.10	1.30	7.00	1.56
End of the postpartum period	6.02	0.89	7.08	1.10

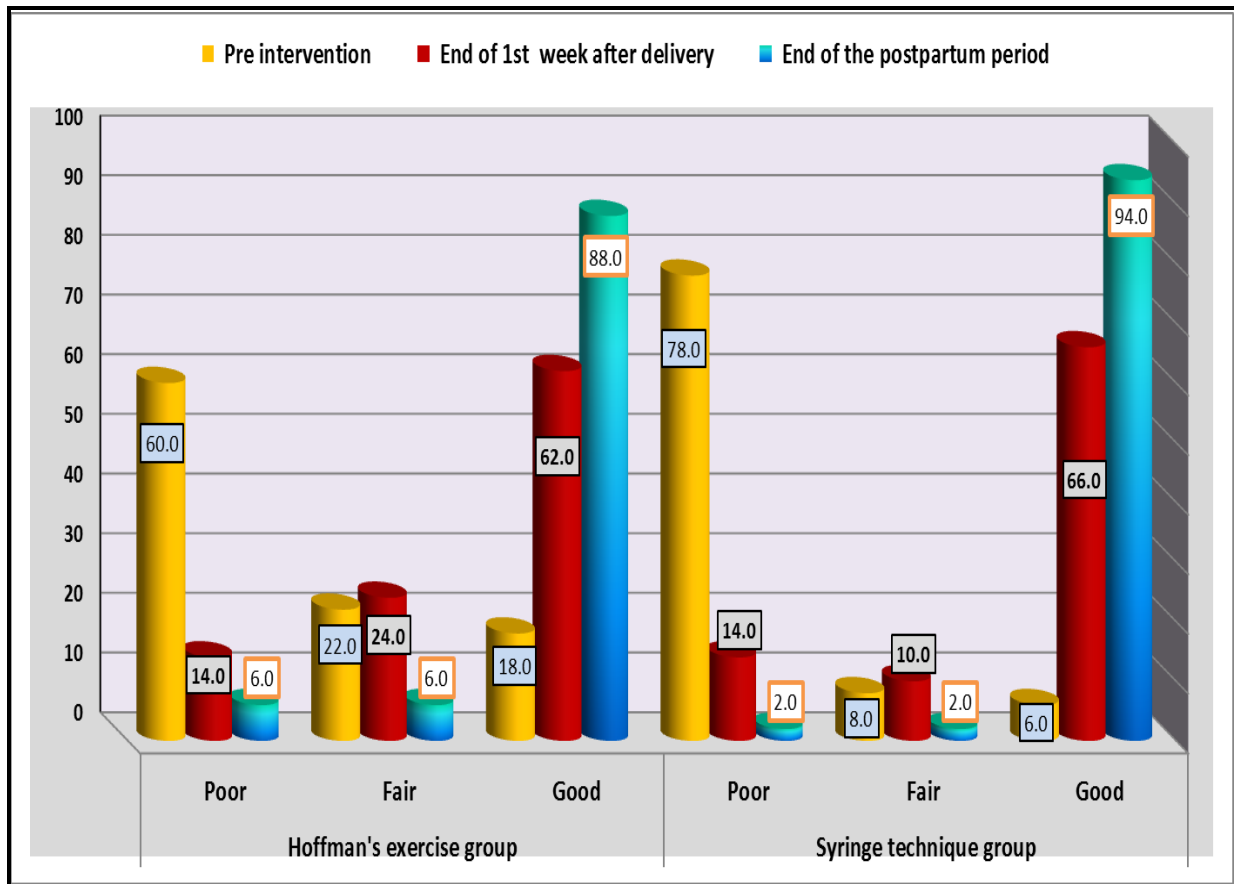


Figure (2): Distribution of the studied primiparous mothers' according to their total score Level of LATCH (N= 100).

Table (7): Distribution of the studied primiparous mothers' according to their infant breastfeeding assessment (N= 100).

Infant breastfeeding assessment tool (IBFAT)	Studied Primiparous Mothers																Chi square test		
	Hoffman's exercise group								Syringe technique group										
	Not pleased (0)		Fairly pleased (1)		Pleased (2)		Very pleased (3)		Not pleased (0)		Fairly pleased (1)		Pleased (2)		Very pleased (3)				
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%			
Readiness of the infant to feed																			
Pre intervention	39	78	9	18	2	4	0	0	32	64	14	28	3	6	1	2		2.977	0.395
End of 1 st week after delivery	1	2	4	8	15	30	30	60	2	4	6	12	19	38	23	46		2.128	0.546
End of the postpartum period	2	4	5	10	3	6	40	80	0	0	3	6	2	4	45	90		2.994	0.393
Rooting																			
Pre intervention	28	56	17	34	3	6	2	4	31	62	17	34	0	0	2	4		3.153	0.369
End of 1 st week after delivery	3	6	6	12	14	28	27	54	2	4	7	14	13	26	28	56		0.332	0.954
End of the postpartum period	2	4	4	8	6	12	38	76	2	4	3	6	3	6	42	84		1.343	0.719
Fixing of baby on the breast																			
Pre intervention	35	70	8	16	5	10	2	4	27	54	10	20	11	22	2	4		3.504	0.320
End of 1 st week after delivery	2	4	7	14	13	26	28	56	1	2	8	16	9	18	32	64		1.394	0.707
End of the postpartum period	3	6	4	8	7	14	36	72	3	6	0	0	42	84	43	86		20.728	<0.001*
Sucking pattern																			
Pre intervention	40	80	5	10	2	4	1	2	39	78	9	18	2	4	0	0		2.116	0.549
End of 1 st week after delivery	2	4	4	8	14	28	30	60	1	2	3	6	14	28	32	64		0.541	0.910
End of the postpartum period	2	4	5	10	8	16	35	70	0	0	3	6	4	8	43	86		4.654	0.199

*Statistically significant (P<0.05)

Table (8): Distribution of the studied primiparous mothers' according to their mean level of infant breastfeeding assessment (N= 100).

Total infant breastfeeding score	Hoffman's exercise group		Syringe technique group	
	Mean	SD	Mean	SD
Pre intervention	3.66	1.12	3.16	1.50
End of 1 st week after delivery	7.28	2.05	7.74	1.80
End of the postpartum period	8.02	2.45	8.98	2.02

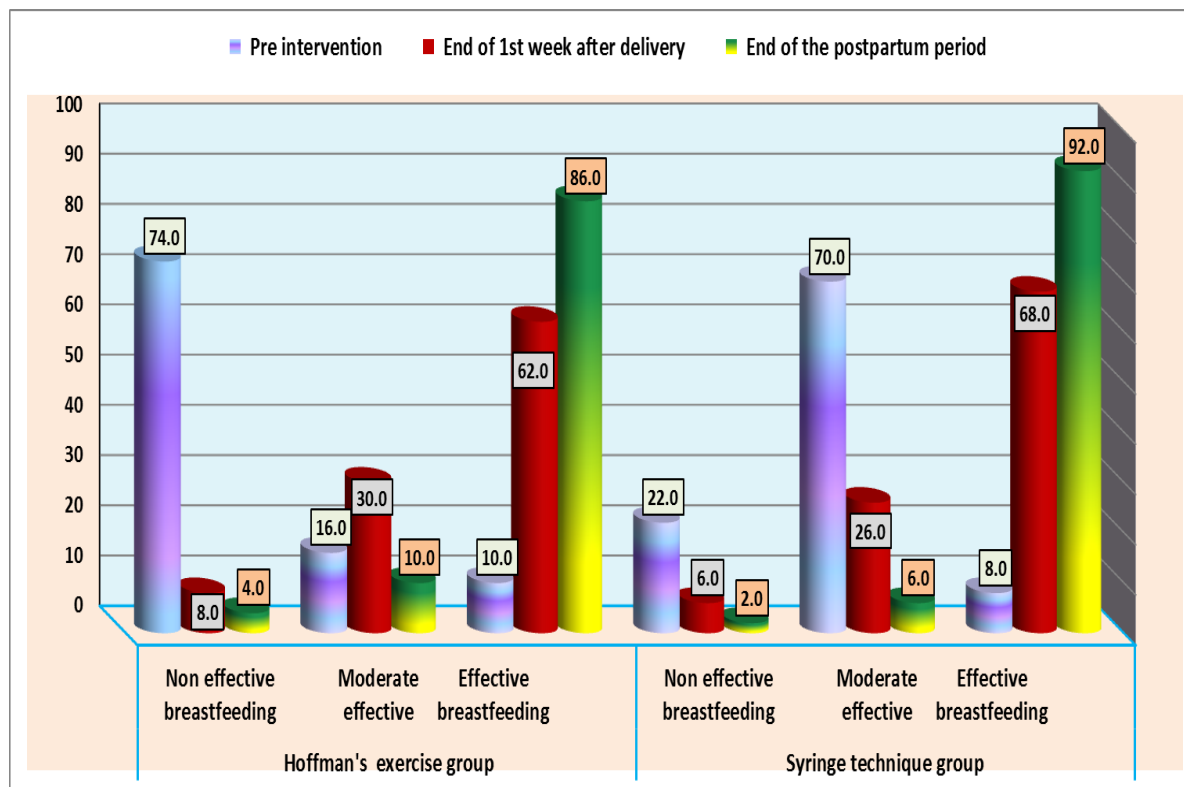


Figure (3): Distribution of the studied primiparous mothers' according to their total score level of infant breastfeeding assessment (N= 100).

Table (9): Correlation between studied primiparous mothers' total knowledge scores regarding inverted nipple, total LATCH and their total infant breastfeeding score in Hoffman's exercise group (N= 50).

Hoffman's exercise group	Total knowledge score		Total LATCH score	
	r	P-value	r	P-value
Total LATCH score				
Pre intervention	0.745	<0.001*		
End of 1 st week after delivery	0.691	<0.001*		
End of the postpartum period	0.498	<0.001*		
Total infant breastfeeding score				
Pre intervention	0.682	<0.001*	0.657	<0.001*
End of 1 st week after delivery	0.639	<0.001*	0.641	<0.001*
End of the postpartum period	0.637	<0.001*	0.662	<0.001*

*Statistically significant (P<0.05)

Table (10): Correlation between studied primiparous mothers' total knowledge scores regarding inverted nipple, total LATCH and their total infant breastfeeding score in syringe technique group (N= 50).

Syringe technique group	Total knowledge score		Total LATCH score	
	r	P-value	r	P-value
Total LATCH score				
Pre intervention	0.670	<0.001*		
End of 1 st week after delivery	0.722	<0.001*		
End of the postpartum period	0.519	<0.001*		
Total infant breastfeeding score				
Pre intervention	0.737	<0.001*	0.681	<0.001*
End of 1 st week after delivery	0.836	<0.001*	0.788	<0.001*
End of the postpartum period	0.529	<0.001*	0.616	<0.001*

*Statistically significant (P<0.05)

Table (1): Displays that more than half of the studied primiparous mothers (52%) were aged more than 25 years old with a **mean age \pm SD =22.4 \pm 3.12** years in **Hoffman's exercise group**, while in **syringe technique group** nearly three quarters of them (70%) were aged more than 25 years old with a **mean age \pm SD =23.07 \pm 2.48** years. More than half of studied mothers in both groups were married at age from 20 to less than 30 years old. The table also revealed that 60% and 52% of them had a secondary education in Hoffman and syringe group respectively. It also noticed that the most of studied mothers in both group were housewife, while 76% and 66% of the studied subject among Hoffman and syringe group were from urban areas respectively and more than three quarters of them in both groups lived in extended family.

Table (2): Demonstrates that the majority of the studied mothers in both groups were pregnant once and **Mean \pm SD** of gestational weeks was **38.25 \pm 1.30** and **39.32 \pm 1.41** in Hoffman and syringe groups respectively. It also noticed that the most of them in both groups had no experience of abortion, while 68% and 58% of the mothers in Hoffman and syringe groups respectively start antenatal care visit at first trimester of pregnancy. Private clinic was the most commonly place of antenatal care mentioned by 74% and 58% of the studied mothers in Hoffman and syringe groups respectively. The table also shows that 50% and 58% of them had two antenatal care visits in Hoffman and syringe groups respectively and the majority of them in both groups don't attend antenatal care classes. Also, it is pointed out that cesarean section is mentioned by more than four fifths of them in both groups as mode of delivery and the most of them had no complication during delivery.

Table (3): Illustrated that there is a highly statistical significant positive improvement in the studied primiparous mothers' knowledge the end 1st week after delivery and the end of the postpartum period compared to pre-intervention for all the knowledge items regarding inverted nipple in Hoffman and syringe groups.

Table (4): Demonstrated that there is a highly positive improvement in the studied primiparous mothers' total mean level of knowledge at the end of 1st week after delivery and the end of the postpartum period compared to pre-intervention for all the knowledge items regarding inverted nipple in Hoffman and syringe groups.

Figure (1): Shows a highly statistical significant improvement in the total score level of knowledge regarding inverted nipple, which improved from 12%, 4% of the studied primiparous mothers' in Hoffman and syringe groups respectively who had high level of knowledge regarding inverted nipple pre intervention to 82%, 90% the end of 1st week

after delivery and 74%, 80% at the end of the postpartum period.

Table (5): Illustrated that there is a highly statistical significant positive improvement in the level of LATCH in both groups at the end of 1st week after delivery and the end of the postpartum period in all sub items (latch, audible swallow, type of nipple, comfort and hold).

Table (6): Displayed that there is a highly positive improvement in the studied primiparous mothers' total mean level of LATCH at the end of 1st week after delivery and the end of the postpartum period compared to pre-intervention in Hoffman and syringe groups.

Figure (2): Revealed that 18%, 6% of the studied primiparous mothers' in Hoffman and syringe groups respectively who had good level of LATCH pre intervention compared to 62%, 66% at the end of 1st week after delivery and 88%, 94% at the end of the postpartum period.

Table (7): Illustrated that there is a highly statistical significant positive improvement in the level of infant breastfeeding assessment in Hoffman and syringe groups at the end of 1st week after delivery and the end of the postpartum period in all sub items of the infant breastfeeding assessment.

Table (8): Displayed that there is a highly positive improvement in the studied primiparous mothers' total mean level of the infant breastfeeding assessment at the end of 1st week after delivery and the end of the postpartum period compared to pre-intervention in Hoffman and syringe groups.

Figure (3): Demonstrated that 10%, 8% of the studied primiparous mothers' in Hoffman and syringe groups respectively had effective breast feeding pre intervention, that increased obviously to 62%, 68% at the end of 1st week after delivery and 86%, 92% at the end of the postpartum period.

Table (9): Displayed that there was significant positive correlation between the studied primiparous mothers' total score level of knowledge, total LATCH and their total infant breastfeeding in Hoffman exercise group pre – intervention, the end of 1st week after delivery and the end of the postpartum period with $p < 0.001^*$.

Table (10): Displayed that there was significant positive correlation between the studied primiparous mothers' total score level of knowledge, total LATCH and their total infant breastfeeding in syringe technique group pre – intervention, the end of 1st week after delivery and the end of the postpartum period with $p < 0.001^*$

Discussion:

Global health organizations strongly advocate for breastfeeding as the optimal way to nourish infants. They emphasize the importance of initiating breastfeeding immediately after birth and continuing exclusive breastfeeding for the first six months of life. **WHO (2018); American Academy of Pediatrics (2021)**. However, inverted nipples

will make it difficult for newborn to breastfeed is one of the reasons that prevent exclusive breastfeeding **Fang, et al., (2021)**. So, study was conducted to determine the effect of two nursing interventions strategies for inverted nipple on efficiency of early initiation of breastfeeding among primiparous mothers.

In the present study, demographic data of the subjects taken was homogenous in both groups. The age of the studied mothers in the Hoffman's exercise group ranged from 19-27 years and in the syringe technique group ranged from 18-32 years. The majority of both groups were married. In addition, most of them in both groups had no experience of abortion. More than half of the mothers in Hoffman's exercise group had antenatal care in first trimester while three fifths of them in syringe groups start antenatal care at second trimester.

In relation to the total knowledge score regarding inverted nipple in the present study, in the Hoffman's exercise group only 12% of the studied mothers had high total score of knowledge pre intervention, which improved to most of them in the first week after delivery, and three quarters of them at the end of the postpartum period. While, in the syringe technique group only 4% of the studied mothers had high total score of knowledge pre intervention, which improved to the majority of them in the first week after delivery, and more than three quarters of them at the end of the postpartum period.

These findings indicate that the knowledge of mothers regarding inverted nipple improved in both groups in the first week after delivery, and at the end of the postpartum period. These results agree with **Fang et al., (2021)** randomized study at Nanjing, China, which explored the effect of multi-dimensional postpartum visits (MDPV) applied to parturient with inverted nipple on improving breastfeeding rates .They found that the implementation of MDPV for parturient with inverted nipples could effectively improve their knowledge regarding inverted nipple. Also, agrees with **Awad, et al., (2023)** several studies have investigated the impact of educational interventions on breastfeeding practices. One study examined the effectiveness of a prenatal education program in enhancing knowledge and self-care skills related to preventing breast problems among first-time mothers. They mentioned that following the implementation of prenatal educational program, scores of knowledge improved significantly.

Moreover, these findings are similar with **Prince Rose (2019)** conducted in Dindigul, India, evaluated the effect of a structured teaching program on the knowledge of expectant mothers regarding breastfeeding challenges. The findings revealed a statistically significant improvement in knowledge levels following the program. In

addition, agrees with **Kareem, et al., (2018)** who examined the effectiveness of teaching program on knowledge regarding breast feeding problems among postnatal mothers at Minia, Egypt. They revealed that the teaching program was effective in improving the knowledge of postpartum mothers. From the researchers' point of view, this agreement between the result of the present study and other studies might be attributed to the fact that mothers are always interested when they are offered knowledge especially those that will affect the health of their children whatever the method of teaching are.

The LATCH assessment tool provides a systematic and straightforward approach to identifying breastfeeding difficulties. Considering the high prevalence of such problems in the early postpartum period, utilizing the LATCH tool for regular assessments can facilitate timely interventions and improvements in breastfeeding technique. In addition to the assessment by item of the tool, the identification of the total score can help in the daily monitoring of the mother –baby pair regarding the success breastfeeding (**Rapheal et al., 2023; Griffin et al., 2022**).

Concerning the success of early breastfeeding (measured by LATCH), there was a highly statistical significant positive improvement in the level of LATCH in Hoffman's exercise and syringe technique groups at 1st week after delivery and at the end of the postpartum period in all sub items (latch, audible swallow, type of nipple, comfort and hold) . In addition, there was a highly positive improvement in the studied primiparous mothers' total mean level of LATCH at the end of 1st week after delivery and at the end of the postpartum period compared to pre-intervention in both groups. According to the current study finding for Hoffman's exercise group, the current result agrees with **Abd-Ella & Mohammed (2021)** who evaluated the effectiveness of Hoffman's exercise on the level of breastfeeding among primiparous mothers with inverted nipple at a private clinic at Mansoura City, Dakahlia Governorate, Egypt .They found a significant increase in LATCH scores among subjects in the intervention group compared to those in the control group. They added that, Hoffman's exercise has beneficial effect on managing inverted nipple and promotes successful breastfeeding. Also, agrees with **Thurkkada et al., (2022)** in which Hoffman's exercise was applied in postnatal mothers with grade 1 inverted nipple and found that the score difference of LATCH between the intervention and control groups was found to be statistically significant. Moreover, these findings are similar with **Bulbuli, et al., (2018)** in there randomized control trial in India on mothers in the immediate postpartum period. They concluded that the Hoffman's exercise for inverted nipples showed significant improvement in LATCH in immediate

postpartum mothers compared with the control group.

While, according to the current study finding for syringe technique group, this finding agree with **Bagal, et al., (2017)** study .They found that there was good latching and profuse breast milk secretion even from first day as effect of early initiation of breast feeding. Also, **Oliveira et al., (2021)** confirmed that the performance of nursing mothers and newborns during feeding presents higher LATCH scores on the 28th day compared to the first day of life of the newborns. They concluded that it was evidenced that early interventions aimed at promoting and maintaining breastfeeding should be implemented by nurses, beginning in the prenatal period and indispensable in the first puerperal week, especially those related to breastfeeding technique .While, **Shah et al., (2021)** in their study, found that normally there was a progressive increase in the total score of LATCH over the days of the infant's life until 6 weeks in term healthy babies.

Breastfeeding support, is one of the key things is breastfeeding assessment. The infant breastfeeding assessment tool (IBFAT) is one of the most frequently used and acceptable assessment tools .It can be used for the prediction of exclusive breastfeeding during the first six weeks postpartum (**Puapornpong, et al., (2020)**). **Regarding the effectiveness of infant feeding (measured by BFAT)**, there was a highly statistical significant positive improvement in the level of BFAT in Hoffman's exercise and syringe technique groups at 1st week after delivery and at the end of the postpartum period in all sub items of the BFAT. Also, there was a highly positive improvement in the studied primiparous mothers' total mean level of the BFAT 1st week after delivery and at the end of the postpartum period compared to pre-intervention in Hoffman and syringe groups.

This study's findings regarding Hoffman's exercise technique align with previous research conducted by **Padmavathi (2015)** which examined its effectiveness in improving breastfeeding rates among 30 primiparous mothers experiencing inverted or retracted nipples in India. Also, agrees with **Abd-Ella & Mohammed (2021)** ; **Thurkkada et al., (2022)** studies .They found that Hoffman's exercise were found to be effective in increasing breastfeeding and breast milk intake. Moreover, **Bulbuli et al., (2018)** mentioned that the experimental group in their study showed significant improvement in BFAT scores and were statistically highly significant.

While, according to the current study finding for syringe technique group, a randomized clinical trial study, compared between the effect of three nursing interventions, which were; manual technique, rubber band and syringe technique method on successful breastfeeding pattern among the

antenatal mothers in the selected government maternity hospital, Pondicherry, India. They found that the total mean level of the BFAT was high among the manual technique mothers followed by the rubber band and syringe method groups **Manjubala (2017)**. Also, the present study finding disagrees with the results of a study on managing the nipple problem among mothers in Kolkata and compared between effect of the syringe technique and rubber band for nipple problem. While the syringe technique, a component of Hoffman's exercises, demonstrated some initial promise, limitations were identified. Primarily, nipple protrusion was not consistently achieved following syringe application, and medical supervision was deemed necessary for its implementation. **Chakrabathi & Basu (2011)**.

Furthermore, disagree with **Jain et al., (2013)** who studied women having retracted nipple in Medical College at Srinagar. They compared between three groups, Comparative studies evaluating various methods for addressing nipple retraction further support these observations. Research comparing syringe, rubber band, and manual techniques (sucking by the husband) revealed that while syringe use showed some improvement in breastfeeding patterns for postpartum mothers with nipple problems, both rubber band and manual techniques proved to be more effective in establishing successful breastfeeding practices.. Meanwhile, **Bagal et al., (2017)** found that when using the syringe technique, breastfeeding assessment scores of all infants in the intervention and control groups of mothers with inverted nipples. While, according to **Nabulsi et al., (2022)** Furthermore, a randomized clinical trial concluded that the syringe technique had no significant impact on increasing breastfeeding success rates among women with inverted nipples during the first six months postpartum when compared to standard care.

From the researchers' point of view, the success of early breastfeeding (measured by LATCH), and the effectiveness of infant feeding (measured by BFAT) in both groups, may be related to the early detection of primiparous mothers with inverted nipple and to the support provided to them by providing either Hoffman's exercise or syringe technique that was in line with mothers' preferences. Relating to the **correlation between the studied primiparous mothers' total score level of knowledge, total LATCH and their total infant breastfeeding in both Hoffman's exercise group and syringe technique group** ,there was significant positive correlation between the studied primiparous mothers' total score level of knowledge, total LATCH and their total infant breastfeeding in both Hoffman's exercise group and syringe technique group pre -intervention, 1st week after delivery and the end of the postpartum

period. This positive correlation may indicate as concluded by **Oberfichtner et al., (2023)** these findings highlight the widespread desire for breastfeeding among expectant mothers and emphasize the need for comprehensive education and support systems. Enhanced knowledge regarding breastfeeding practices and postpartum care can positively influence both the initiation and duration of breastfeeding.

Conclusion

The findings of the present study revealed that Hoffman's exercise and syringe technique considered effective methods to improve infant LATCH and level of infant breastfeeding assessment. Furthermore there was positive correlation between the studied primiparous mothers' total score level of knowledge, total LATCH and their total infant breastfeeding in Hoffman and syringe groups' pre –intervention, the end of 1st week after delivery and the end of the postpartum period. Thus, the research hypothesis had been achieved after implementation of the nursing intervention strategies.

Recommendations

Based on the findings of the present study, the following recommendations were proposed:

1. Planning and developing training programs for women with inverted nipple in order to improve update and refresh their knowledge and qualify their practices.
2. Replication of the study under different circumstances, including larger sample sizes and different settings, in Egypt, to ensure the generalizability of the study findings.

Reference

- **Abd-Ella, N., & Mohammed, S. (2021):** Effectiveness of Hoffman's exercise on the level of breastfeeding among primiparous women with inverted nipple. *Egyptian Journal of Health Care*, 12, 607–624. Doi: <https://doi.org/10.21608/ejhc.2021.143538>.
- **Abdulkareem, A., Ghalib, H., & Rashaan, M. (2023):** Factors causing delayed presentations of breast cancer among female patients in Sulaimani Governorate, Kurdistan region, Iraq. *BMC Women's Health*, 23(1), 612. Doi: <https://doi.org/10.1186/s12905-023-02656-x>.
- **Ahmed, N., Mohamed, N., & Heiba, M. (2023):** Effect of antenatal educational package on primiparous women's knowledge and practices for prevention of selected aspects **postpartum** complications. *Zagazig Nursing Journal*, 19(1), 45-65.
- **American Academy of Pediatrics. (2021):** Breastfeeding. [https://www.healthychildren.org/English/ages_stages/breastfeeding/Pages/Where We Stand Breastfeeding.aspx](https://www.healthychildren.org/English/ages_stages/breastfeeding/Pages/Where_We_Stand_Breastfeeding.aspx).
- **Awad, E., EL-Sai,d F., Maklad, S. (2023):** Effect of prenatal educational program on Knowledge and self-care practices regarding prevention of breast problems among lactating primiparous women. *Tanta Scientific Nursing Journal*, 28(1), 128-148.
- **Bagal, S., Salunkhe, A., Salunkhe, H., Kakade, V., & Mohite, R. (2017):** A comparative study to assess problem of inverted nipple and its relationship to successful breast feeding among antenatal **mothers**. *International Journal of Health Sciences & Research*, 7(4), 280-288.
- **Bardwal, C. (2020):** A Study to assess the effect of health teaching on knowledge regarding nipple abnormality among the primigravida mother in civil hospital, Mehsana. *International Journal of Nursing Education and Research*, 8(2), 259-261. Doi: <https://doi.org/10.5958/2454-2660.2020.00056.3>
- **Bulbuli, A., Fernandes, S., & Shelke, S. (2018):** Effect of Hoffman's exercises on flat or inverted nipples in immediate postpartum mothers—a randomized control trial. *Indian Journal of Physiotherapy and Occupational Therapy*, 12(3), 88–92. Doi: <https://doi.org/10.5958/0973-5674.2018.00063.1>.
- **Chakrabathi, K., & Basu, S. (2011):** Management of flat or inverted nipples with simple rubber bands. *Breastfeed Med*, 6(4), 215-219.
- **Dos-Santos, B., & Ruiz-Castilla, M. (2024):** Successful correction of inverted nipple using silicone implants: A pioneering surgical approach. *JPRAS open*, 40, 230-233. Doi: <https://doi.org/10.1016/j.jptra.2024.03.017>
- **Fang, Y., Zhu, L., & Bao, L. (2021):** The effect of multi-dimensional postpartum visits on increasing the breastfeeding rate of parturients with inverted nipple: a randomized Study. *Annals of Palliative Medicine*, 10(3), 3078-3058. Doi: <https://doi.org/10.21037/apm-21-165>.
- **Griffin, C., Amorim, M., Almeida, F., Marcacine, K., Goldman, R., & Coca, K. (2022):** LATCH as a systematic tool for assessment of the breastfeeding technique in **maternity**. *Acta Paul Enferm.*, 35, eAPE03181. Doi: <http://dx.doi.org/10.37689/actaape/2022AO03181>
- **Jain, S., Jain, A., Sing, A., Goswami, D., U padhyay, A., & Negi N. (2013):** Newer innovations in treatment of retracted nipple ,*Indian J Pediatr* ,80(6),483–487. Doi: <https://doi.org/10.1007/s12098-012-0883-9>
- **Jensen, D., Wallace, S., & Kelsay, P. (1994):** LATCH: a breastfeeding charting system and documentation tool. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, 23(1), 27-32. Doi: <https://doi.org/10.1111/j.1552-6909.1994.tb01847.x>.
- **Kareem, Z., Emam, E., Mohamed, H. (2018):** Effectiveness of teaching program on knowledge regarding **the** breast feeding problems among postnatal mothers. *Minia Scientific Nursing Journal*, 4(1), 1-10.

- **Khatib, M., Gaidhane, A., Upadhyay, S., Telrandhe, S., Saxena, D., Simkhada, P., & Quazi, S. (2023):** Interventions for promoting and optimizing breastfeeding practices: An overview of systematic review. *Frontiers in Public Health*, 11, 984876. Doi: <https://doi.org/10.3389/fpubh.2023.984876>
- **Kim, H. (2024):** Sonographic evaluation and various diseases of the nipple-areolar complex (nac) of the breast. *Ultrasound in Medicine and Biology*, 50, S15-S18. Doi: <https://doi.org/10.1016/j.ultrasmedbio.2024.01.033>
- **Ma, N., Fu, S., & Luan, J. (2022):** A two-step technique for correction of severe inverted nipples with **minimally invasive procedures**. *Aesthetic Plastic Surgery*, 46(6), 2735-2741). Doi: <https://doi.org/10.1007/s00266-022-02925-4>.
- **Manjubala D. (2017):** Intervention strategies for successful breastfeeding: randomized clinical trial. *Acad J Ped Neonatol*, 3(1). DOI: <https://doi.org/10.19080/AJPN.2017.03.55560-1>.
- **Matthews, M. (1988):** Developing an instrument to assess infant breastfeeding behaviour in the early neonatal period. *Midwifery*, 4(4), 154-165. DOI: [https://doi.org/10.1016/S0266-6138\(88\)80071-8](https://doi.org/10.1016/S0266-6138(88)80071-8).
- **Meek, J. (2017):** The American Academy of Pediatrics New Mother's Guide to Breastfeeding (Revised Edition): Completely Revised and Updated Third Edition. Bantam.
- **Nabulsi, M., Ghanem, R., Smaili, H., & Khalil, A. (2022):** The inverted syringe technique for management of **inverted** nipples in breastfeeding women: A pilot randomized controlled trial. *International Breastfeeding Journal*, 17, 9. DOI: <https://doi.org/10.1186/s13006-022-00452-1>.
- **Oberfichtner, K., Oppelt, P., Fritz, D., Hrauda, K., Fritz, C., Schildberger, B., Lastinger, J., Stelzl, P., Enengl S. (2023):** Breastfeeding in primiparous women – expectations and reality: a prospective questionnaire survey. *BMC Pregnancy and Childbirth*, 23, 654. DOI: <https://doi.org/10.1186/s12884-023-05971-1>.
- **Olivas-Menayo, J., & Berniz, C. (2021)** Inverted nipple correction techniques: an algorithm based on scientific evidence, patients' expectations and potential complications. *Aesthetic plastic surgery*, 45, 472-480). DOI: <https://doi.org/10.1007/s00266-020-01909-6>.
- **Oliveira, R., Silva, M., Lopes, B., Brito, M., Rocha, R., Carneiro, C. (2021):** Evaluation of the performance of nursing mothers and newborns during feedings in the neonatal period: a comparative study. *Cogit. Enferm.*, v26:e75517. DOI: <http://dx.doi.org/10.5380/ce.v26i0.75517>.
- **Padmavathi P. (2015):** Effectiveness of Hoffman's exercise on successful breastfeeding among primipara mothers with flat and retracted nipples. *International Journal of Nursing Education and Research*, 3(2), 124–126.
- **Prince Rose, G. (2019):** A Study to Assess the Effectiveness of Structured Teaching Programme on Knowledge Regarding Breast Feeding Problems among Primi Gravida Mothers at the Selected Hospitals at Dindigul. (Doctoral dissertation, Jainee College of Nursing, Dindigul District. India).
- **Puapornpong, P., Hamontri, S., Srisuwan, S., Ketsuwan, S., & Wongin S. (2020):** The use of the infant breastfeeding assessment tool among high risk mothers for the prediction of exclusive breastfeeding for six weeks postpartum. *Thai Journal of Obstetrics and Gynaecology*, 28(4), 235-243.
- **Rapheal ,S., Rajaiah ,B., Karupanan, R., Abiramalatha, T., & Ramakrishnan, S. (2023):** LATCH Score for Identification and Correction of Breastfeeding Problems- A Prospective Observational Study .*INDIAN PEDIATRICS* ,60,37-40.
- **Shah, M., Roshan, R., Parikh, T., Sathe, S., Vaidya, U., & Pandit, A. (2021):** LATCH score at discharge: a predictor of weight gain and exclusive breastfeeding at 6 weeks in term healthy babies. *JPediatr Gastroenterol Nutr.*,72(2),e 48-e5.
- **Sun, J., Shao, S., Wan, H., Wu, X., Feng, J., Gao, Q., & Xie, L. (2024):** Prediction models for postoperative recurrence of non-lactating mastitis based on machine learning. *BMC Medical Informatics and Decision Making*, 24(1), 106). DOI: <https://doi.org/10.1186/s12911-024-02499-y>
- **Thurkkada, A., Rajasekharan Nair, S., Thomas, S., Sreelekha, P., Sanu, S., Chandran, P., & Pillai Sreekanth, G. (2023):** Effectiveness of hoffman's exercise in postnatal **mothers** with grade 1 inverted nipples. *Journal of Human Lactation*, 39(1), 69-75). DOI: <https://doi.org/10.1177/08903344221102890>
- **Tomita, A., Tahara-Sasagawa, E., Yonezawa, K., Usui, Y., & Haruna, M. (2023):** Reliability and validity of the Japanese version of the Infant Breastfeeding **Assessment** Tool. *Midwifery*, 121, 103670. DOI: <https://doi.org/10.1016/j.midw.2023.103670>.
- **Waleed, Y., Hanna, F., Ahmed, A., & Salah El-Din, A. (2018):** Subareolar Dermofibrous Flaps for Correction of Inverted Nipple. *The Medical Journal of Cairo University*, 86(March), 417-424.) DOI: <https://doi.org/10.21608/mjcu.2018.55141> .
- **Wang, Q., Zhong, X., Yang, Q., Li, Z., & Li, H. (2023):** Sun-Cross Running Suture Combined with Transverse to Longitudinal Skin Closure to Correct Severe Inverted Nipple. *Aesthetic Plastic Surgery*, 1-9). DOI: <https://doi.org/10.1007/s00266-023-03767-4> .
- **World Health Organization. (2019):** Global breastfeeding scorecard, 2019: increasing commitment to breastfeeding through funding and improved policies and programmes (No. WHO/NMH/NHD/19.22). World Health Organization

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