

Nurses' Performance in Premature Transition from Gavage to Breastfeeding: Effect of Education Program

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Abstract

Transition of premature infants to direct breastfeeding remains suboptimal in neonatal intensive care units (NICUs) due to lack of formal policies for initiation. Nurses' knowledge and practices have an important role in initiating breastfeeding among premature infants. Aim: The present study aimed to evaluate the effect of educational program on nurses' performance in premature transition from gavage to breastfeeding. Design: A quasi-experimental design was utilized. Setting: This study was conducted at NICU in El Manial Pediatric Hospital affiliated to Cairo University Hospitals. Subject: A purposive sample consisted of 40 nurses from the previously mentioned setting were included. Tools of data collection: Tool I: A structured interviewing questionnaire sheet to assess nurses' personal characteristics and their knowledge regarding initiation of breast-feeding for preterm infants. Tool II: An observational check list tool in order to assess nurses' practice regarding transition of premature infant from gavage to breastfeeding. Tool III: IOWA model for evaluating nurses' beliefs toward transition of premature infant from gavage to breast feeding. Results: There were highly statistical significant differences ($P<0.001$) concerning nurses' knowledge, practice and beliefs pre/post-implementation of the educational program and there was a positive correlation between total nurses' knowledge, practice and beliefs regarding transition of premature from gavage to breastfeeding post-implementation of the educational program ($P<0.001$). Conclusion: Implementation of the educational program affect positively on nurses' Performance (knowledge, practice and beliefs) regarding transition of premature from gavage to breastfeeding. Recommendation: Providing nurses in NICUs with continuous educational program regarding transition of premature from gavage to breastfeeding.

Key words: Education Program – Premature – Transition to Breastfeeding– Nursing

Introduction

The American Academy of Pediatrics (AAP) and the American College of Obstetrics and Gynecology (ACOG) reported that prematurity is defined as delivery that occurs after the twentieth week and before 37 completed weeks of gestation, regardless of birth weight (AAP/ACOG, 2012). About 7–

12 % of deliveries in developed countries are preterm. In the United States, about 84% of these infants are born between 31-36 weeks of gestation, and are considered to be moderately preterm. As well, about 16% of premature infants are born between 24-30 weeks of gestation and are categorized as extremely preterm (Arenson & Drake, 2014).

Each year about 15 million babies are born preterm and their survival chances vary dramatically around the world. However, WHO, (2010) reported that the number of preterm births in Egypt was 136,900 and the preterm birth rate 7, 3%. In addition, the rank for preterm birth rate in Egypt in the same year all-over the world was 152 (**Blencowe et al., 2012**).

Some of the most frequently encountered problems in preterm infants are oral feeding difficulties (**Samara et al., 2010**). About half of all preterm infants (40-45%) experience oral feeding difficulties. Most problems arise when preterm infants are introduced to oral feeding. A disorganized sucking pattern, in coordination of the suck-swallow-breath sequence leading to episodes of apnea, bradycardia and oxygen de-saturations, and a version or hypersensitivity to touch around /or in the mouth formulate these difficulties (**Hwang et al., 2010**).

Oral feeding difficulties affect infant's ability to reach independent oral feeding, prolong hospital stay, and lead to long term feeding difficulties and developmental problems. So, it is now the responsibility of health care providers to solve these problems (**Lau & Smith, 2012**).

Preterm infants who are admitted to the neonatal intensive care unit (NICU) have an increased need for the protective properties found in breast milk. Yet, upon admission to the NICU, many of these high-risk infants will require gavage feedings until they are more physiologically stable or developmentally ready for oral feedings by breast or bottle (**White & Parnell 2013**).

Breastfeeding is considered a natural act, although it is not always an easy one for mother and premature infant to establish. Breast milk can be considered the ideal nutrition for preterm infants that provide physiologic and neuro-developmental

protection for premature infants. Caregivers in NICUs need to make every effort to ensure that the first oral feeding opportunity for these infants is by direct breastfeeding (**Zveibil & Gabriel, 2011**).

It was stated by **McGrath, (2013)** stated that while human milk holds many advantages, direct breastfeeding is considered to be more physiologically suitable for preterm infants, compared to bottle feeding expressed human milk. In addition, **Nyqvist, (2013)** reported in spite of all these well-documented advantages, transition to direct breastfeeding in preterm infants remains suboptimal in NICU current practices vary among health care providers, specially nurses, mainly because of a lack of formal policies to manage transitional feeding issues in premature infants.

The ability of the premature infant to make the transition from gavage feedings to total oral feeding depends mainly on a number of factors that include global neuro-developmental status related to behavioral organization, rhythmic sucking-swallowing-breathing coordination, and cardiorespiratory regulation. Other infant characteristics such as low birth weight, GA at birth, and neonatal illnesses also affect the transition time to exclusive nipple feeding (**Yildiz et al., 2011**).

Tube feeding is needed to meet all requirements for caloric intake or to supplement breast and bottle feeding. Once oral feeding is initiated, infants are gradually weaned from tube to independent oral feeding. The criteria to advance oral feedings are also based on nurses' and physicians' observations of infants' oral feeding performance e.g. overall milk intake and the feeding duration, and on their physiological and behavioral responses e.g. episodes of apnea, bradycardia, and oxygen de-saturation, choking, gagging, and vomiting during oral feeding (**Garber, 2013 and Durvasula, et al., 2014**).

It was reported by **Garber, (2013)** that, education and training about the many facets of breastfeeding are essential for nursing staff. Education about human milk used in the NICUs has been shown to change NICU nursing staff's knowledge and attitudes. Staff attitudes and behaviors are important to breastfeeding families and affect the breastfeeding experience, as well as increasing human milk feeding rates.

Nurses who are worked in NICUs are highly skilled professionals specially trained in reading the behavioral cues of premature infants, even a small error on the part of the NICUs nurse can lead to the life-threatening situation for the premature infant, so their professional role is of complex and critical nature. They customize a plan of care for each family, each individualized plan of care is designed to provide an environment that supports the preterm infant while his or her brain is still developing, encourages active involvement of the parents in the preterm infant's care, promotes the comfort of the preterm and provides strategies for the preterm to successfully integrate his or her responses to environmental stimuli (**American Academy of Pediatrics, 2014**).

The nurse should be aware of the signs of feeding readiness and different behavioral responses to assist the preterm infant to attain successful oral feeding, feeding cues include; stirring, rooting, sucking on fingers, awake and crying. Preterm infant can be brought to awaken quiet state with pacifier sucking, which improves the self-regulatory behavior during feeding (**Garber, 2013**).

Significance Of The Study:

Oral feeding problems in the preterm are prominent health concerns because of their negative impact on children's health and the quality of life. They affect 25% of all the newborn infants (**Lau, 2014**). However, premature infants born have a higher occurrence of feeding disorders than full term

infants. About 30-40% of the preterm infants encounter oral feeding problems (**Fanaroff, 2012**). Nurses at NICUs are in need to have specific knowledge related to the transition of premature infants from gavage to direct breastfeeding, especially regarding the benefits and challenges of breastfeeding a preterm infant (**Black, 2012**).

The NICU where the current study performed did not have a formal written policy to manage the transition of premature infants from gavage to direct breastfeeding. Consequently, nurses in this setting had lack specific knowledge and practice related to the transition of premature infants from gavage to direct breastfeeding. So that, the current study aimed to introduce educational program for nurses regarding transition of premature from gavage to breastfeeding at NICUs; through an improvement in nurses' knowledge, practice and beliefs.

Aim Of The Study

The present study was aimed to evaluate the effect of educational program on nurses' performance in premature transition from gavage to breastfeeding. This achieved through assessing:

- Nurses' knowledge regarding transition of premature from gavage to breastfeeding.
- Nurses' practice related to transition of premature from gavage to breastfeeding.
- Nurses' beliefs toward transition of premature from gavage to breastfeeding.

Research Hypothesis:

The following hypothesis was tested:

Nurses who received educational program about transition from gavage to

breast feeding for premature in NICU will had higher satisfaction score post-program application than before.

Material And Methods

Research design:

The current study utilized a quasi-experimental design.

Setting of the study:

The current study was conducted at NICU affiliated to El Manial - Kaser El Aini, Pediatric Hospital affiliated to Cairo University Hospitals where the free health services for neonates who referred from obstetric hospital were provided. The capacity of NICU was 28 well equipped incubators and 10 radiant warmer. In addition, there was a monitor and oxygen output for each incubator.

Subjects:

The subjects of this study included a purposive sample consisted of 40 nurses who worked at the previously mentioned setting and provided care for neonates regardless their qualification and years of experience.

Tools of Data Collection:

The following tools were designed and used by the researchers for data collection after reviewing the related literature.

Tool I: A structured interviewing questionnaire sheet (pre/post): This tool was developed by the researchers and included two parts;

Part one: this part identified nurses' personal characteristics, it included five items related to; nurses' age, qualification, job title, years of experience in NICU and attending educational courses about breast-feeding.

Part two: this part was designed by the researchers after reviewing related literature in order to assess nurses' knowledge regarding initiation of breast-feeding for preterm infants in the form of closed end questions and was included thirteen questions about; definition of successful oral feeding in preterm infants, feeding reflexes of preterm infant to start breast-feeding, benefits of human milk for both preterm infants and their mothers, criteria indicated preterm infants are ready for breast feeding, principles and rational for initiating breast-feeding for preterm infant.

Scoring system:

The nurses were assigned two for correct answers, one for incomplete correct answers and zero for incorrect/don't know answers. The total score of the questionnaire equals 26 grads. These scores were summed and converted into a percentage; the nurses' total knowledge was classified into: satisfactory $\geq 75\%$ and unsatisfactory $< 75\%$.

Tool II: An observational check list sheet (pre/post): This tool was adapted by the researchers after reviewing related literatures from (Pimenta et al., 2008; Collins et al., 2008; de Aquino & Osorio, 2009; Kenner & McGrath, 2010 and Yildiz & Arikan, 2012) in order to assess nurses' practice regarding transition of premature infant from gavage to breastfeeding. This tool was consisted of 13 steps which cover the following four categorize:

Category (1): non-nutritive sucking (NNS) and oral stimulation which done through the use of pacifier, gloved finger or an emptied breast. Oral stimulation, consisting of peri-oral and intra-oral stimulation interventions, can have beneficial effects on oral feeding performance when applied before or during oral feedings in medically stable preterm infants.

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Category (2): Promotion of direct breastfeeding experience and bottle avoidance.

Category (3): Exposure to human milk odor.

Category (4): Cue-based feeding approach, which based on observation and identification of the infant's readiness signs to start oral feedings.

Scoring system:

Nurses' practice categories as done correctly (one score) and done incorrectly/none done (zero) with total of thirteen scores. The total scores of nurses' practice were categorized into; competent practice ($\geq 85\%$) and $<85\%$ for incompetent nurses' practice.

Tool III: IOWA model

This model was adapted from **Titler et al., (2001)** and some modifications were done to suite the nature of the current study. This model was used to assess nurses' beliefs toward transition of premature infant from gavage to breast feeding.

Scoring system:

In relation to nurses' beliefs, their responses were classified into agree, natural and not agree. Then the total responses were evaluated as positive beliefs ($\geq 75\%$) and negative beliefs ($< 75\%$).

Program Construction

It was designed by the researchers after extensive review of related literature, its content was prepared based on the results obtained from pre program assessment using the interviewing questionnaire sheet, observation check lists sheet and IOWA model for nurses' beliefs, as well as, literature review aiming to satisfy the studied

nurses' deficit knowledge, practice and beliefs about premature infant transition from gavage to breastfeeding.

Validity and reliability:

The study tools were tested for its content validity by group of three experts in the pediatric medical and nursing field. The required modifications were carried out accordingly and then test-retest reliability was applied. Testing reliability of the study tools was done by Cronbach alpha, the result was 0.80

Preparatory Phase

During this phase, a review of the literature was done by the researchers through reviewing the available local and international related literature to be oriented with various aspects of the research problem and to develop the study tools.

Pilot study:

A pilot study was carried out included 10% of the studied nurses (4 nurses) to test the applicability and feasibility of the study tools, modification was done according to the results of the pilot study. Nurses included in the pilot study were excluded from the main study sample since some modifications were done in the form of rephrasing for some statements. The final form of the tools was then obtained and the time needed for completing each tool was also determined.

Ethical Considerations

An official permission to conduct the study was obtained through an issued letter from the Dean of the Faculty of Nursing, Helwan University to the medical and nursing directors of the previously mentioned settings. The letter included the title, aim and the expected outcome of the study. Before carrying out the present study, oral consent was obtained from all nurses. For data

collection, the studied nurses were informed about the purpose and the expected outcomes of the study. The researchers informed them that the participation in the study is voluntary; they have the right to withdraw from the study at any time without giving any reason and that their responses would be held confidentially. They were also assured that, anonymity and confidentiality will be guaranteed, as well the gathered data used for the research purpose only.

Field work:

The process of data collection was carried out over six months from the beginning of May 2016 to the end of October 2016. Nurses were divided into small groups, they were interviewed three times/ week during morning and afternoon shifts, the average number of observed nurses / time was 5-6 nurses. Every group had 7 sessions in this program; each session was variable and ranged between 30-45 minutes and conducted as 4 sessions for practice and 3 for theory.

Firstly, nurses' knowledge, practice and beliefs regarding transition of premature from gavage to breast feeding in NICU were evaluated before the beginning of program this took about 30-45 minutes for each nurse to answer the study tools. In the beginning of each session of the program, the researchers used to review the previous session, answer their questions, and encourage sharing experience of each of the practice.

Then the educational program guided by instruction hand out was prepared by the research to satisfy the deficit needs in knowledge, practice and belief of the studied nurses toward initiating breastfeeding for premature as revealed from the pre-assessment phase of the researcher .it was written a simple words, Arabic language were used to suit the nurse's level of understanding.

Then, instructional handouts about transition of premature from gavage to breastfeeding in NICU were distributed for each nurse in order to provide them with a step-by-step framework about transition of premature from gavage to breastfeed. Handouts contained knowledge about transition of premature from gavage to breastfeeding and practice

Different methods of teaching were followed as lecture, group discussion, demonstration and re-demonstration. Instructional media included handout, colored poster, colored transparencies and real object. Nurses were motivated and encouraged to cooperate and participate actively in the study throughout its different stages

Program Evaluation

After the implementation of the program the post-test was done to the studied nurses' knowledge, practice and belief by the same format of the pre-test to evaluate the effect of the implemented program.

Statistical Design:

The collected data were organized, revised, scored, tabulated and analyzed using the number and percentage distribution. Statistical analysis was done by computer using statistical package for social sciences (SPSS). Qualitative variables were compared using chi-square test and quantitative variables were compared using Pearson correlation coefficient. The significance of the results was considered as follows: When $P > 0.05$: it is statistically insignificant difference while $P < 0.05$ & $P < 0.001$: it is statistically significant difference.

Limitation of study:

Frequent absenteeism of nurses, overload of nurses' work, and drop out of some nurses due to days off especially during program implementation.

Results:

Table (1) and figure (1) showed personal characteristics of the studied nurses, it was revealed that the mean age of them was 30.87 ± 5.59 years, more than half of nurses had diploma of secondary nursing school and worked as staff nurse (52.5% & 62.5%, respectively). Regarding attending educational courses about breast-feeding this table showed that, 75% of nurses didn't attend and the majority of them (80%) had equal and more than 3 years of experience in NICUs.

Table (2) revealed that, there were high statistically significant differences ($P < 0.000$) between nurses' knowledge regarding transition of preterm infants from gavage to breastfeeding during pre/post-program implementation, where the minority of nurses had correct knowledge level pre- program implementation compared to post- program implementation as the majority of them had correct level of knowledge in relation to benefits of human milk for preterm infants, criteria of premature readiness for initiating breast feeding, relation between length of hospital stay and success of exclusive breast-feeding for premature at discharge (92.9%, 92.9% & 95.7%, respectively).

In relation to nurses' practice regarding transition of premature from gavage to breastfeeding **table (3)** showed that, pre-implementation of the program most nurses had incompetent practice. Meanwhile, the majority of nurses had competent practice in post-program implementation as there were statistically significant differences ($P < 0.001$). Such as, all of nurses (100%) had competent practice regarding; putting gauze soaked with

breast milk near the preterm infant's nose during gavage feeds for olfactory stimulation and encouraging mothers to be present on the unit as often as possible to promote breastfeeding.

Table (4) showed that, there were statistical significant differences ($P \leq 0.001$; $P \leq 0.05$) in relation to nurses' beliefs regarding transition of premature infants from gavage to breastfeeding during pre and post- program implementation as there was an obvious improvement in nurses' beliefs post-program implementation than pre-program implementation.

Figure (2) reflected that, there was an improvement in nurses' beliefs toward the transition of premature infants from gavage to breastfeeding; where as 6% of nurses had positive beliefs in pre-implementation of the program compared to the majority of nurses (94%) had positive beliefs in post-implementation of the program regarding transition of premature infants from gavage to breastfeeding.

Table (5) shows that, there were highly statistically significant difference between nurses' knowledge and practice in pre and post-program implementation.

Table (6) demonstrated that there was a negative correlation between nurses' knowledge and practice in pre-implementation ($P > 0.05$), while there was a positive correlation between their knowledge and practice in post- implementation ($P < 0.05$).

Table (7) showed correlation between nurses' knowledge, practice and beliefs toward transition of preterm infants from gavage to breastfeeding in pre/post- program implementation, it was revealed that there were a highly statistically significant correlation between them pre and post program implementation ($r = 0.866, 0.927, 0.785$ pre program)

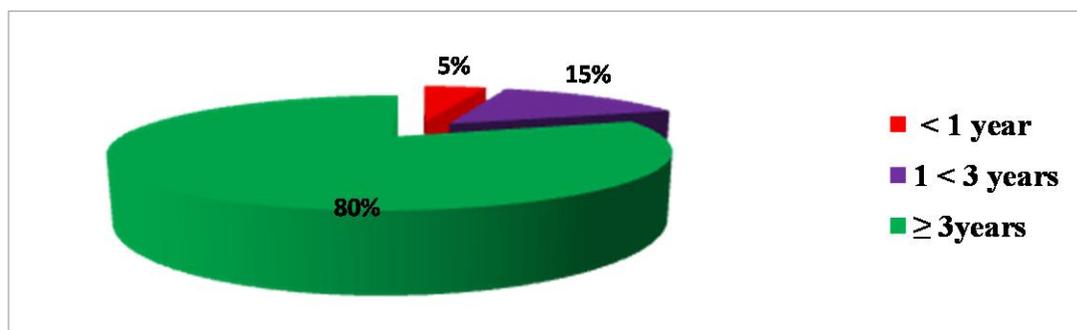
Table (8) showed that, there was no statistical significant difference ($P>0.05$) observed between nurses' knowledge, practice and beliefs with their age, qualification, years of experience at NICU and attending educational courses about breast-feeding for premature infants in NICUs toward transition of premature infants from gavage to breastfeeding during pre/post-implementation of the program. Meanwhile,

the same table reflected that there was a statistical significant difference ($P<0.05$) between nurses' knowledge and their attending educational courses about breast-feeding for premature infants in NICUs during pre/post- implementation of the program.

Table (1): Frequency and percentage distribution of the studied nurses according to their personal characteristics (n=40)

Nurses' Personal Characteristics	No.	%
Age/years:		
20 < 30	4	10.0
30 < 40	25	62.5
Qualification:		
Bachelor degree in Nursing Science	8	20.0
Diploma of Technical Institute of Nursing	11	27.5
Diploma of Secondary Nursing School	21	52.5
Job title (description):		
Head nurse	11	27.5
Technical nurse	4	10.0
Nurse staff	25	62.5
Attending educational courses about breast-feeding		
Yes	10	25.0
No	30	75.0

Figure (1): Percentage distribution of the studied nurses according to their years of experience at NICU (n=40)



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Table (2): Percentage distribution of nurses' knowledge regarding transition of preterm infants from gavage to breastfeeding pre/post- program implementation (n=40)

Nurses' Knowledge	Pre-implementation			Post-Implementation			X ²	P-value
	correct	incomplete correct	incorrect/don't know	correct	incomplete correct	Incorrect /don't know		
Definition of successful oral feeding in preterm infants	14.3	12.5	73.2	76.8	17.8	5.4	23.14 3	0.000
Feeding reflexes' of preterm infant to start breast-feeding.	37.5	0.0	62.5	87.2	11.6	1.2	4.571	0.033
Benefits of human milk for preterm infants.	26.8	10.0	63.2	92.9	4.6	2.5	42.90	0.000
Benefits of human milk for mothers.	14.3	11.0	74.7	89.8	6.2	4.0	23.14	0.000
Criteria of premature readiness for initiating breast feeding	19.6	10.0	70.4	92.9	3.6	3.5	41.14	0.000
principles and rational of initiating breast-feeding for premature	16.1	0.0	83.9	86.7	7.4	5.9	48.25	0.000 **
Barriers against initiating breast feeding for premature.	26.8	0.0	73.2	83.9	16.1	0.0	58.80	0.000 **
Factors of mothers' inability or resistance to initiate breast-feeding for their premature	12.1	2.2	85.7	79.8	17.0	3.2	18.28 6	0.000
Relation between length of hospital stay & success of exclusive breast-feeding for premature at discharge	17.3	4.1	78.6	95.7	3.3	1.0	43.18	0.000
Challenges of breast-feeding premature infant	18.8	0.0	81.2	88.4	7.3	4.3	48.25	0.000 **
Environmental factors in NICU which facilitate breast-feeding initiation	3.4	0.0	96.6	73.7	19.5	6.8	46.76	0.000 **
Importance of teaching mothers about initiation of breastfeeding.	12.5	0.0	76.8	83.3	13.7	3.0	54.72	0.000 **
Importance of encouraging mothers to participate in premature transition from gavage to breastfeeding	17.9	0.0	82.1	80.4	11.5	8.1	69.24	0.000 **

**Highly statistical significant difference ($P \leq 0.001$)

Table (3): Percentage Distribution of nurses' done correctly practice regarding transition of premature from gavage to breastfeeding pre/post- program implementation (n=40).

Nurses' practice	Pre-implementation		Post-implementation		X ²	P-value
	No.	%	No.	%		
Initiation of direct breast feeds without a medical prescription	2	5.0	32	80	49.95	0.001**
Recognize oral feeding readiness cues in a preterm infant (sings & symptoms of readiness)	3	7.5	37	92.5	46.76	0.001**
Direct breastfeeds can be initiated when a preterm infant shows oral feeding readiness.	4	10.0	37	92.5	54.72	0.001**
Application of the four categories regarding breastfeeding initiation.	14	35.0	35	87.5	69.24	0.001**
Routinely, give a pacifier to preterm infants during gavage feeds	2	5.0	38	95.0	46.06	0.001**
Put gauze soaked with breast milk near the preterm infant's nose during gavage feeds for olfactory stimulation	9	22.5	40.0	100.0	45.64	0.001**
Take the time needed to position the preterm infant at the breast	10	25.0	37	92.5	46.76	0.001**
Supporting a preterm infant during his/her transition from gavage to breastfeeding.	8	20.0	38	95.0	46.06	0.001**
Assessment of a preterm infant's oral feeding ability with a bottle, even if he will be breastfed	0	0.0	38	95.0	197.90	0.001**
Making sure that breastfeeding takes priority over bottle feeding when a mother wishes to breastfeed exclusively.	11	27.5	38	95.0	51.31	0.001**
Encouraging mothers to be present on the unit as often as possible to promote breastfeeding (if they wish to breastfeed their preterm infant).	8	20.0	40.0	100.0	50.61	0.001**
Often resorting to lactation consultant or occupational therapist when the nurse have questions regarding transition from gavage to breastfeeding	16	40.0	36	90.0	29.07	0.001**
Positioning a preterm infant at the breast	14	35.0	35	87.5	69.24	0.001**

****Highly statistical significant difference (P ≤ 0.001)**

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Table (4): Percentage Distribution of nurses' beliefs related statements toward transition of premature infants from gavage to breastfeeding pre/post program implementation (n=40)

Nurses' beliefs-related statements	Pre-implementation			Post-Implementation			X ²	P-value
	Disagree (%)	Neutral (%)	Agree (%)	Disagree (%)	Neutral (%)	Agree (%)		
I believe that introduction of non-nutritive sucking should be held until the preterm infant reaches a certain gestational age	92.0	0.0	8.0	0.0	0.0	100.0	81.30	0.001**
I think that the preterm infant shows the same behavior while breastfeeding as a full term baby who is successfully breastfeeding	44.0	8.0	48.0	6.0	12.0	82.0	11.90	0.0026*
I believe that a preterm infant who has apnea/bradycardia episodes while being bottle-fed will have the same behavior when breastfed	78.0	0.0	22.0	4.0	10.0	86.0	47.24	0.001**
I believe that a preterm infant who shows good suction with a pacifier will be able to feed orally more easily.	66.0	2.0	32.0	84.0	6.0	10.0	33.29	0.001**
I believe that it is easier to give breast milk in a bottle than to put a preterm infant at his/her mother's breast	54.0	0.0	46.0	88.0	12.0	0.0	39.58	0.001**
I believe that giving human milk in a bottle has the same benefits as direct breastfeeding	56.0	28.0	16.0	92.0	6.0	2.0	59.0	0.001**
I believe that a successful breastfeed involves ingestion of certain volume of breast milk, according to a preset schedule	8.0	44.0	48.0	82.0	12.0	6.0	11.90	0.0026*
I believe that I can turn the preterm infant to be exclusively breastfed before NICU discharge	0.0	78.0	22.0	10.0	86.0	4.0	48.25	0.001**
I believe that breastfed preterm infants have longer hospital stays because of insufficient weight gain	28.0	16.0	56.0	86.0	10.0	4.0	58.80	0.001**
I think that a preterm infant who successfully makes the transition to direct breast-feeding during his/her stay in the NICU has a higher chance of continued breastfeeding at 6 months of age	90.0	2.0	8.0	6.0	14.0	80.0	58.22	0.001**
I believe that direct breast-feeding make the preterm infant more tired than bottle feeding.	33.0	32.0	35.0	86.0	8.0	6.0	84.14	0.001**

*Statistical significant difference ($P \leq 0.05$) **Highly statistical significant difference ($P \leq 0.001$)

Figure (2): Distribution of nurses' total beliefs regarding transition of premature infants from gavage to breastfeeding pre/post- implementation (n=40)

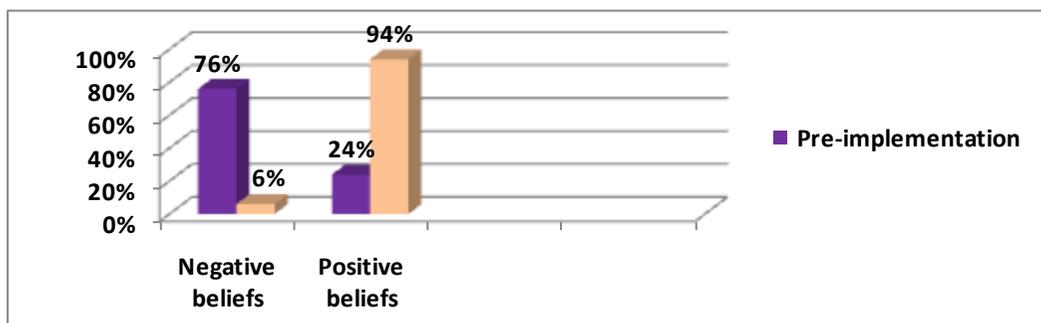


Table (5): Relation between nurses' knowledge and practice regarding transition of preterm infants from gavage to breastfeeding pre/post- program implementation (n=40)

Level of practices	Level of knowledge							
	Pre- implementation				Post- implementation			
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory	
	No.	%	No.	%	No.	%	No.	%
Competent	18	45	0	0	29	72.5	0	0
Incompetent	17	42.5	5	12.5	7	17.5	4	10
Total	35	87.5	5	12.5	36	90	4	10
P - value	0.031*				0.001**			

*Significant at $P \leq 0.05$

**highly significant at $P < 0.001$

Table (6): Correlation coefficient between total nurse' knowledge and practice scores during pre/post program implementation (n=40)

Variables	Knowledge pre	Practices post
	r / P- value	r / P- value
Knowledge post	-----	.427/ < 0.05*
practice pre	-.216/ > 0.05 ^{NS}	-----

NS: No statistical significant difference at $P > 0.05$ *Statistically significant difference at $P < 0.05$

Table (7): Relation between nurses' knowledge, practice and beliefs toward transition of preterm infants from gavage to breastfeeding in pre/post- program implementation (n=40)

Items	Pre- implementation		Post- implementation	
	r	p	r	p
Nurses' knowledge	0.866	.000	0.754	.000**
Nurses' practice	0.927	.000	0.662	.000**
Nurses' beliefs	0.785	.000	0.438	.000**

** $P < 0.001$ ----highly statistically significant

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Table (8): Comparison between total Mean Scores of nurses' knowledge, practice beliefs with their personal characteristics toward transition of premature infants from gavage to breastfeeding in relation to personal characteristics pre/post- implementation (n=40)

Aspects of comparison	Nurses' knowledge (X±SD)	Nurses' practice (X±SD)	Nurses' beliefs (X±SD)
Age/years			
20 < 30	11.1±4.2	45.5±3.7	2.4±3.8
30 < 40	11.5±2.04	43.4±1.9	5.2±1.7
≥ 40	9.8±3.3	35.0±2.7	9.5±4.1
t- test	0.075	2.575	1.026
P-value	>0.05	>0.05	>0.05
Qualification:			
Bachelor degree in Nursing Science	13.4±3.1	44.4±2.6	7.1±1.5
Diploma of Technical Institute of Nursing	12.5±2.9	42.7±3.2	9.1±4.1
Diploma of Secondary Nursing School	9.7±2.7	38.8±5.9	5.0±3.1
t- test	0.807	0.451	1.899
P-value	>0.05	>0.05	>0.05
Years of experience at NICU:			
< 1 year	17.0±3.7	42.6±2.8	7.0±3.4
1 < 3 years	6.5±3.20	48.1±2.7	6.1±1.9
≥ 3 years	8.8±2.3	41.3±3.1	9.0±3.1
t- test	2.042	1.452	2.307
P-value	>0.05	>0.05	>0.05
Attending educational courses about breast-feeding for premature infants in NICUs			
Yes	5.9±2.3	41.3±3.1	6.6±1.98
No	14.1±2.0	43.03±1.7	4.7±1.98
t- test	6.627	0.305	0.390
P-value	<0.05*	>0.05	>0.05

*A statistical significant difference (P ≤ 0.05)

Discussion

In NICUs, the transition of premature infant from gavage to total oral feeding can takes from few days to several weeks. It depends on how early the infant was born and on the presence of any medical complications (Bache et al., 2014). However, Black, (2012); Nyqvist, (2013) and Briere, (2015) stated that to sum up, persistence of suboptimal transition practices is often linked with inaccurate beliefs coupled with a lack of knowledge related to the transition to direct breastfeeding. Nurses who are worked in neonatal units have the responsibility to care for premature infants and provide accurate information regarding

the benefits and methods of breastfeeding. The existence of a standardized care plan could assist in establishing breastfeeding in the premature newborn.

Regarding nurses characteristics the results of the current study showed that, (table 1 & figure 1) the mean age of them was 30.87± 5.59 years and more than half of nurses had diploma of secondary nursing school, and worked as staff nurse. Concerning to attending educational courses about breast-feeding this table showed that, three quarters of nurses didn't attend and more than three quarters of them had equal and more than 3 years of experience in NICUs. These results were agreed with Mohammed et al., (2014) who studied "The

effect of developmentally supportive care training program on nurses' performance and behavioral responses of newborn infants" and found that more than half of nurses aged from 20 to less than 30 years old, they have duration of 9 years of experience in NICU. In the same context, **Ziadi et al., (2015)** who studied "A pilot nursing educational intervention promoting an evidence-based transition from gavage to direct breastfeeding in a NICU" and found that the studied nurses had 7.4 years as a mean experience in NICU.

In relation to the nurses' knowledge regarding transition of preterm infants from gavage to breastfeeding during pre/post-program implementation (**table 2**), the result of the current study revealed that, there were highly statistically significant differences. Where-as, the minority of the studied nurses had good knowledge level before program implementation compared to after program implementation as the majority of them had good level of knowledge in relation to benefits of human milk for preterm infants, criteria of premature readiness for initiating breast feeding, relation between length of hospital stay, success of exclusive breastfeeding for premature at discharge and the environmental factors in NICU which facilitate breast-feeding initiation.

However, the result of the current study was supported by **Ziadi et al., (2015)** who revealed that, there was a positive improvement in the nurses' knowledge after intervention of nursing education program. Where, at the end of the educational intervention 100% of participant nurses reported having sufficient knowledge regarding the transition from gavage to direct breastfeeding in comparison to 43% of the nurses pre-intervention. In addition, 100% of the nurses agreed that direct breastfeeding could be started before 32 weeks post intervention, in comparison with 71% pre-intervention.

The improvement of nurses' knowledge was also demonstrated in relation to preterm infants' oral sucking development, and knowledge regarding interventions promoting an evidence-based transition from gavage to direct breastfeeding. This improvement might be in part due to the teaching strategy that was selected. Indeed, the problem-solving teaching strategy enhances the learning experience by allowing participants to use theoretical knowledge in a realistic situation (**Khatiban & Sangestani, 2014**). This improvement might be due to the implementation of education training program and the teaching strategy used for nurses.

In relation to nurses' practice regarding transition of premature infants from gavage to breastfeeding (**table 3**) the present study showed that, there were improvements in their practice post- program implementation allover steps in comparison to pre- program implementation results. Where, most of the studied nurses had incompetent practice pre-program implementation meanwhile the majority of them had competent practice post- program implementation. However, there were highly statistically significant differences ($P \leq 0.001$; $P \leq 0.05$) between pre/post-program implementation. These findings were obvious as follows; all of nurses had competent practice regarding putting gauze soaked with breast milk near the preterm infant's nose during gavage feeds for olfactory stimulation and encouraging mothers to be present on the unit as often as possible to promote breastfeeding.

This finding was supported by **Treloar, (2012)** who studied "Change in practice used to quantify breast milk intake of pre term infants in a neonatal intensive care unit: test-weighing to Salt Lake City feed plan", who revealed that the improvement in nursing practice that was noted between pre-intervention and post-intervention questionnaires was reflected in multiple statements. After the educational

intervention, nurses' practices in higher percentages regarding the initiation of direct breastfeeding without a medical prescription, assessing a preterm infant's oral feeding readiness, and supporting a preterm infant during his/her transition from gavage to direct breastfeeding. In addition, after the educational intervention, there was an increase in the application of interventions, higher numbers of participant nurses reported using nonnutritive- sucking and oral stimulation, promotion of direct breastfeeding experience and avoidance of bottles, exposure to human milk odour, and cue based feeding approach.

On the same direction, **Fucile et al., (2012)** mentioned that effective nursing interventions to improve premature baby feeding performance as early as possible in order to prevent eating disorders in childhood are needed. In addition, **Neto et al., (2016)** added that it is the responsibility of nurses to observe the communication signals, biological and behavior of the child, to make their decisions and implementing their practices for helping premature infants to acquire skills that needed for initiating efficient oral feeding.

From the researchers' point of view, the incompetent nurses' practice in pre-implementation may be due to the fact that three quarters of them didn't attend training courses regarding breastfeeding and linked with unsatisfactory knowledge. Meanwhile, the improvement in nurses' practice in post-implementation may be explained as the improvement in nurses' knowledge was reflected in the improvement of practice.

According to nurses' beliefs regarding transition of premature infants from gavage to breastfeeding during pre/post-program implementation (**table 4**) the present study findings revealed that, there were highly statistical significant differences as there was an obvious improvement in nurses' beliefs post-program implementation than pre.

However, in post-program implementation all nurses were agreed with the belief toward introduction of non-nutritive sucking should be held until the preterm infant reaches a certain gestational age and most of them were agreed with the belief toward thinking that the preterm infant shows the same behavior while breastfeeding as a full term baby who is successfully breastfed and that a preterm infant who has apnea/bradycardia episodes while being bottle-fed will have the same behavior when breastfed.

However, this finding was agreed with the study done by **Khatiban & Sangestani, (2014)** about "The effects of using problem-based learning in the clinical nursing education on the students' outcomes in Iran: A quasi-experimental study" and revealed that, nurses' beliefs regarding the transition from gavage to direct breastfeeding have improved after application of the program where some beliefs have been strengthened, especially those regarding breastfeeding benefits to preterm infants.

From the researchers' point of view, this improvement in nurses' beliefs may be as a result of the improvement in nurses' knowledge and practice after implementation of the education program which in turn effect positively on their beliefs. So that, the implementation of education training program might have acted as a reminder and reinforced nurses' beliefs regarding breastfeeding preterm infants.

In relation to nurses' beliefs toward the transition of premature infants from gavage to breastfeeding (**Figure 2**) the present study findings reflected that, there was an obvious improvement in nurses' beliefs where the majority of them had positive beliefs in post-implementation of the program compared to minority of nurses who had positive beliefs in pre-implementation of the program. This finding was supported by **Pineda, (2011)** who mentioned that the overall nurses' beliefs (100%) regarding the transition from

gavage to direct breastfeeding have improved after the application of the education program, compared to 31% of before the application of the education program.

From the researchers' point of view, the improvement in nurses' beliefs might be due to the implementation of the education program which acted as a reminder and reinforced nurses' beliefs regarding breastfeeding premature infants.

The result of the current study (**tables 5,6 and 7**) revealed that there was a highly statistically significant positive correlation between pre/post- program implementation in relation to nurses' knowledge, practice and beliefs toward transition of premature infants from gavage to breastfeeding. However, the result of the current study was supported by **Khatiban & Sangestani, (2014)** and **Spatz, (2015)** in the study titled "Report of a staff program to promote and support breastfeeding in the care of vulnerable infants at a children's hospital" and revealed that there were statistical significant differences where the improvement in nurses' knowledge was reflected in the improvement of their practice and beliefs as reported in the post-intervention questionnaire. This result also was agreed with **Abd-Alla, (2010)** who studied "Assuring quality care through a managerial in-service training program for head nurse" and documented that the in-services training program has a beneficial effect in improving the nurse's knowledge and skills.

From the researchers' point of view, This improvement could be related to the content of the educational program that was prepared in the light of actual need assessment of the study subjects in areas of knowledge, practice and beliefs in addition to the different teaching methodology that included the problem-solving teaching strategy, evidence based practice and group discussion that enhances the learning experience by allowing participants to use

theoretical knowledge in a realistic situation. However, this finding approved the importance of application of the education program for nurses in NICUs toward initiation of breastfeeding for premature infants.

Regarding to the comparison between total mean scores of nurses' knowledge, practice and beliefs with their age, qualification, years of experience at NICU and attending educational courses about breast-feeding for premature infants toward transition of premature infants from gavage to breastfeeding in pre/post- implementation (**table 8**) the present study revealed that, there were no statistical significant differences toward all items of the result except in relation to nurses' knowledge and their attendance educational courses about breast-feeding for premature infants in NICU, as there was a statistical significant difference between them. This result was disagreed with **Ahmed & Jalel, (2011)** who studied "Nursing management and leadership" and reported that there was a statistically significant correlation between nurse's performance scores and their level of education. In the same direction, the study carried out by **Ragab et al., (2013)** about "effect of designed educational program on nurse's performance regarding care of patient with blood borne Viral Hepatitis at Assiut University Hospital" clarified that age and years of nurses' experience were positively correlated with total knowledge, practice and attitude scores through immediate post three and nine months post implementing of the training program. In addition **American Association of Colleges of Nursing, (2013)** reported that education has a significant impact on the knowledge and competencies of the nurse clinician, as it does for all health care providers.

From the researchers point of view that may be attributed to the transfer of wrong knowledge and experience from the old to new nurses via convention, which in turn

leads to following the same wrong techniques in caring of premature infants during transition from gavage to breastfeeding. Mean while attending educational courses had appositve effect on nurses' knowledge therefore the educational program should continue to update their knowledge.

Conclusion

Based on the findings of the current study it was concluded that, the application of education program for nurses regarding transition of premature from gavage to breastfeeding in NICU affect positively on their performance, where nurses in post-program implementation had higher satisfaction scores regarding their knowledge, practice and beliefs than in pre-program implementation.

Recommendations

In the light of the study findings, the following recommendations are suggested:

- It is highly recommended to shed light and assess factors affecting transition of pre mature infant from gavage to breastfeeding.
- Accurate assessment of premature infant readiness before transition from gavage to breastfeeding.
- Emphasis the importance of close nursing monitoring supervision of premature infant transformed from gavage to breastfeeding.
- Providing nurses at NICUs with continuous educational program regarding transition of premature from gavage to breastfeeding.

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