

Assessment of Nurses' Performance regarding Trophic Feeding for Preterm Infants at Neonatal Intensive Care Unit

Naglaa F. Galal¹, Hayam R. Tantawi², Azza El-Sayed Ali Hegazy³

¹ Demonstrator of Pediatric Nursing, Faculty of Nursing, El-Fayom University

² Professor of Pediatric Nursing, Faculty of Nursing, Ain-Shams University

³ Assist. Prof. of Pediatric Nursing, Faculty of Nursing, El-Fayoum University.

Abstract

Background: Trophic feeding is the practice of feeding minute volume of enteral feeds in order to stimulate the development of the immature gastrointestinal tract of the preterm infants with no evidence of any adverse effects following trophic feeding. **Aim of the study:** This study aimed to assess nurses' performance regarding trophic feeding for preterm infants at Neonatal Intensive Care Units. **Design:** A descriptive design was used to conduct this study. **Setting:** This study was conducted at Neonatal Intensive Care Unit of El-Fayoum General Hospital. A convenient sample composed of 65 nurses who were working at the previously mentioned setting. **Tools:** three tools were used in this study are, pre-designed interview questionnaire sheet, observational checklists and attitude Likert type rating scale. **Results:** It was found that, more than two fifth of the studied nurses had a poor level of knowledge and more than two thirds of them had incompetent level of practices and more than half had positive attitude regarding trophic feeding. **Conclusion:** There were highly statistically significant differences with positive correlations between knowledge, total practices and total attitude of the studied nurses. **Recommendations:** Setting educational and training programs for neonatal nurses to improve their knowledge and practices regarding trophic feeding at NICUs.

Key words: Trophic Feeding, Neonatal Intensive Care Unit (NICU), Nurses' Performance, Preterm Infants.

Introduction

Advanced neonatal care, improved survival of preterm infants and necessity of providing adequate nutritional regimes has made feeding strategies as one of the major clinical challenges facing NICU staff. Because of excess prematurity, very low birth weight, the preterm infants are not often able to be directly breast fed and prolonged parenteral nutrition will predispose them to sepsis and phlebitis. On the other hand, total enteral feeding by

nasogastric tube will increase the chance of necrotizing enter colitis (NEC) (Tongo et al., 2022).

Preterm birth is defined as birth before 37 completed weeks of gestation or fewer than 259 days from the first date of a woman's last menstrual period. The global estimate of preterm birth was 11.1% and 10.6% in 2010 and 2014, respectively. This has a great regional variation which was approximately 5% in some European countries; and 18% in Sub-Saharan countries. This showed that

low and middle-income countries account for the majority of the world's preterm births, as 60% of it occurred in Sub-Saharan and South Asia countries (Yoshida et al., 2022).

Provision of intense nutritional support with both parenteral and enteral nutrition to preterm neonates born prematurely is necessary. This helps to attain the rate and composition of weight gain approximating the normal neonate at the postmenstrual age, to minimize postnatal growth failure and the risk of enterocolitis and to optimize neurodevelopmental and long term health outcomes. To tackle this problem, trophic feeding (TF) is the preferred choice for preterm feeding (Buck et al., 2022).

Trophic feeding is usually defined as serving small volumes of enteral feeding (EF) which is started within the first few postnatal days. It is minimal enteral nutrition (MEN), gut priming, or hypocaloric feeding that acclimate the immature gut of enteral fasting in preterm infants. It is a relatively recent concept which has been introduced into clinical practice in an attempt to counter the effects of enteral starvation.

It may be defined as the practice of feeding nutritionally insignificant volumes of enteral substrate to sick neonates, to supply nutrients to, and directly stimulate, the developing gastrointestinal system without increasing illness severity. Typically, milk volumes of 12–24 ml/kg/day are given. It is feeding nutritionally insignificant amount (1–2 mL/kg/dose or 10-15ml/kg/day) for immature neonates but stimulates and

supplies nutrients to the developing gastrointestinal system. Its aim is not to feed the baby but the intestine, preferably with colostrum. It is the nutrition provided shortly after birth in an attempt to avoid or reduce parenteral nutrition and its related complications. Those starting TF have more energy intake, improved feeding tolerance, greater and faster weight gain and head growth, less sepsis, significantly fewer days of parenteral nutrition and oxygen supplementation, and consequently earlier discharge (Specht et al., 2022).

Among practiced feeding strategies, trophic feeding which is early initiation of enteral feeding along with parenteral nutrition seems to be the solution. improved feeding tolerance, less need of parenteral nutrition, more mature intestinal motility patterns, increased growth rate, bone mineralization, stable biochemical measures of nutritional status, improved mineral homeostasis, better calcium and phosphorus retention, higher serum calcium and alkaline phosphates activity, and shorter intestinal transit times have been reported following trophic feeding versus parenteral nutrition. These beneficial effects, in turn, could be associated with a significant economic advantage if they reduce the duration of hospitalization (Ramaswamy et al., 2021).

Consequently, neonatal nurses are the primary caregivers in the NICUs; they remain a key position to influence the nutrition of the preterm infants. Nurses can take steps during nursing care such modifying regimens to improve feeding

tolerance, assisting the mother in establishment and maintenance of milk supply; supporting mothers in milk expression, storage and handling techniques. Developing procedures and approaches to feeding of preterm infants' breast milk, providing skin to skin care (Kangaroo care), mouth care, appropriate fortification of mothers' milk, initiating and encouraging mothers to express breast milk for preterm infants and creating opportunities for nurturing bonding experiences between the preterm and parents to achieve optimal normal physical, psychological and emotional development of preterm infants (Birhanu et al., 2022).

Significance of the Study:

Worldwide, of the 130 million neonates born every year, out of approximately 15 million neonates are born preterm. Moreover, prematurity is still a major cause of neonatal mortality and adverse health outcomes that remains a global problem in developing and developed countries. About 123.13% of preterm births at 32 to less than 37 weeks of gestation are reported in Egypt (Amsalu et al., 2022).

Therefore, the pediatric nurses play an important role in preventing the birth of preterm infants by knowing the risk factors and etiology. These will be achieved by applying the prevention levels: Firstly, providing primary prevention to prevent the birth of preterm infants. It is applied in the preconception period by working on healthy women and decreasing the introduction to risk factors and vulnerability. Secondly, providing

secondary prevention at the prenatal time through early detection of these factors.

Finally, preventing complications and providing tertiary prevention and rehabilitation to improve outcomes for this category of infants at the postnatal period (Breintoft et al., 2022). Also, the critical appraisal for the clinical benefits of trophic feeding in the high risk preterm infants reported no evidence of any adverse effects following trophic feeding (Mustapha et al., 2021).

In fact, the major barrier on the path of trophic feeding implementation is insufficient knowledge and awareness. Furthermore, if the nurses' perceptions are known, the negative ones could be changed and directed toward the right path; thereby, an effective step could be taken toward raising awareness and providing appropriate training for nurses about trophic feeding. Therefore, this study aimed to assess nurses' performance regarding trophic feeding for preterm infants at neonatal intensive care unit.

Aim Of The Study

This study aimed to assess the nurses' performance regarding trophic feeding for preterm infants at neonatal intensive care unit (NICU).

Research questions:

1. What is the level of nurses' knowledge regarding trophic feeding for preterm infants at neonatal intensive care unit?
2. What is the level of nurses' practice regarding trophic feeding for preterm infant at neonatal intensive care unit?

3. What is the nurses' attitude regarding trophic feeding for preterm infant at neonatal intensive care unit?

Subjects And Methods:

I. Technical Design

Research design:

A descriptive research design was used to conduct this study.

Setting:

This study was conducted at Neonatal Intensive Care Unit of El-Fayoum General Hospital.

Subject:

A convenient sample included all available nurses working at the NICU of the previously mentioned setting regardless their age, gender, qualifications and experience.

Tools of data collection:

Tool (I): Nurses' Pre-Designed Interview Questionnaire:

It was adapted from **Elhusein & Rshad (2015)** and **Sinha & Venkatnarayan (2017)** and developed, adjusted to the Egyptian culture and translated into an Arabic language by the researcher to assess nurses' knowledge about trophic feeding. It was divided into two parts:

Part I:

This part concerned with characteristics of the studied subjects including:

- Characteristics of the studied nurses such as age, gender, qualifications, marital status, years of experience at NICUs, as well as the attendance of previous training courses about trophic feeding for preterm infants.
- Characteristics of studied preterm infants such as age, gestational age,

birth weight, gender, mode of delivery, medical diagnosis and duration of hospitalization.

Part II:

It was concerned with the nurses' knowledge regarding trophic feeding. It was composed of (37) questions about trophic feeding as, definition, aim, indications, contraindications, benefits and success of trophic feeding. Also, types of feeding tubes, feeding methods, the required amount of breast milk, best types of dairy, problems occurring during installation of feeding tube, results of false insertion, indications for changing tubes, ideal duration for tube changing, complications of trophic feeding, common nursing pitfalls. In addition, encourage breastfeeding and/or breast milk expression. Also, types and benefits of expressed breast milk, best methods of expression, tools and methods for storing breast milk, available temperature, maximum length of time for expressing milk, tips for safe breast milk storage, required amount, safe thawing for storage milk and role of nurses toward trophic feeding. Different types of questions used in this format including closed and open-ended questions, multiple-choice questions and true or false. The questionnaire was filled by the nurses; the time consumed to fill the sheet was from 10 to 15 minutes.

Scoring system:

A scoring system was followed to assess nurses' knowledge about trophic feeding. The right answer was scored one score and the wrong answer was scored zero score. These scores summed up and

converted into a percent score. Then the result classified into 3 categories:

- **Good** knowledge if score $\geq 75\%$.
- **Average** knowledge if score from 60 to less than 75%.
- **Poor** knowledge if score $<60\%$.

Tool (II): Observational Checklists:

It was adopted from **Aliakbari Sharabiani et al., (2017) & Foote et al., (2020)**. It was used to assess the actual nurses' practices regarding trophic feeding at NICUs. The checklists consisted of (73) questions figuring out nurses' practices of trophic feeding such as application of weight (12 steps) length (14 steps), head circumference (11 steps), chest circumference (5 steps) and nasogastric tube insertion (31 steps).

Nurses were observed and their practices were evaluated throughout their working shifts. The researcher filled the checklists; the time consumed to fill the checklist was from 10 to 20 min.

Scoring system:

A scoring system was followed to assess nurses' practices; where each correct practice scored one score and incorrect practice scored zero score. These scores were summed up and converted into a percentages score. Then the result classified into 2 categories:

- **Competent** if scores $\geq 85\%$.
- **Incompetent** if scores $<85\%$.

III. Attitude type- rating Scale

This scale designed by the researcher in the light of related literature and used to assess the attitude of the nurses toward trophic feeding for preterm infants at

NICUs. It included 15 items asking about nurses' attitude regarding trophic feeding at NICUs.

Scoring system:

Neonatal nurses responses classified as "agree", "uncertain", "disagree" and respectively scored 3, 2 and 1. The scores of the items summed up and converted into percentage scores. Then all data classified into two categories (positive attitude if score $\geq 70\%$ and negative attitude if score $< 70\%$).

III. Operational Design:

Preparatory phase:

It included reviewing the related literatures and theoretical knowledge of various aspects of the study using books, articles, internet searches and periodicals.

Pilot Study:

The pilot study carried out on 10% of the study sample (7 nurses) to test the content, the effectiveness and time consumed to fill in study tools. Based on the results of the pilot study the necessary modifications were done.

Validity and Reliability:

The content validity of the study tools was assessed by a panel of 5 experts in the field of nursing for its clarity, content and sequences of items. According to their suggestions, some modifications were done in the form of: Adding others for questions related to benefits and barriers of trophic feeding application at NICU. The internal consistency of the developed tools was tested for their reliability by Cronbach's Alpha for testing internal consistency of

the tools. The reliability was 0.792 for nurses' knowledge questionnaire sheet, 0.804 for nurses' practices and 0.835 for nurses' attitude.

Field Work:

The actual fieldwork was carried out for data collections over 6 months started from the beginning of February, 2022 years until the end of July, 2022. The researcher attended 2 days/week to collect data. Each nurse interviewed individually according to their physical and mental readiness. In addition, the mitigating circumstances of the work. The researcher started by introducing herself to each nurse, giving a clear and brief idea about the aim of the study and its expectations. The researcher observed the nurse while giving trophic feeding for preterm infants.

IV. Administrative Design:

Actual official permission was obtained by submission of official letters including the title and the purpose of the study were submitted from the Dean of Faculty of Nursing, to the directors of El-Fayoum General Hospital and subsequently to the Head of NICUs to get an approval for conducting the study.

V. Statistical Design

Upon completion of data collection, data was organized, categorized, tabulated, entered and analyzed using Statistical Package for the Social Science (SPSS), IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp. Statistical presentation and analysis of the present study was conducted, using mean, standard deviation (SD), chi-square test (χ^2) that used to compare between groups

in qualitative and linear correlation coefficient that used for detection of correlation between two quantitative variables in one group. Statistical significance was considered at (P-value <0.05), where P value >0.05 mean no significant, while P value <0.001 mean high significant

Results

Table (1): Illustrated that, the mean age of the studied nurses were 31.26 ± 4.58 and all of them (100%) were females, while, slightly less than three fifth of them (58.6%) were married. In addition, this table showed that more than three quarters of them (76.9%) did not attend previous training courses about trophic feeding.

Figure (1): This figure showed that, the majority of the studied nurses (90.8%) had technical institute of nursing and the rest of them (6.2%) had diploma in nursing and (3.1%) had bachelorate degree of nursing science.

Figure (2): Showed that slightly less than two fifth of the studied preterm infants (58.5%) were given artificial feeding.

Table (2): Nurses total knowledge score about trophic feeding of preterm infants at neonatal intensive care units. It was portrayed that, only less than one quarter of the studied nurses (24.6%) had good knowledge about trophic feeding at NICUs, while, 32.3% of them had average knowledge. On the other hand, 43.1% of them had poor knowledge.

Figure (3): Showed that, more than one quarter of total actual nurses practices (27.7%) regarding trophic

feeding at NICUs were competent while, less than three quarters of them (72.3%) incompetent practice.

As regards the studied nurses' total attitude **figure (4)** illustrated that, more than half of the studied nurses (55.4%) had positive attitudes regarding the trophic feeding at NICUs, while less than one half of them (44.6%) had negative attitudes

Concerning the relationship between nurses knowledge and their characteristic, this **table (3)** proven that, there was highly statistically significant difference was observed between nurses knowledge with their age, years of experience and previous attendance of training courses about trophic feeding with p-value < 0.001 respectively. While, there was no statistical significant difference between nurse knowledge with

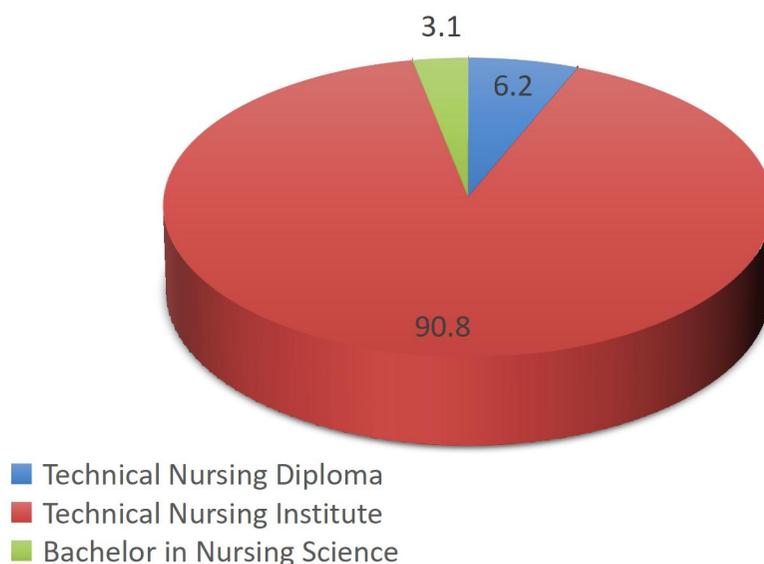
their marital status and educational qualifications.

It is evident from **table (4)** that, there was highly statistically significant differences with positive correlations between total knowledge scores, total practices scores and total attitudes scores respectively with p-value <0.001.

Table (5): Showed that, there were highly statistically significant differences between nurses total practices scores with age, years of experience and training courses respectively with p-value <0.001. In addition, there were statistically significant differences between total practices scores and educational qualifications with p-value <0.05. While, there were no statistical significant differences between nurses' practices and marital status.

Table (1): Numbers and Distributions of The Studied Nurses According to Their Characteristics (n=65).

Nurses characteristics	No. = 65	
	No	%
Age in years:		
20 : < 25	40	61.5
25 : < 30	17	26.2
30 : < 35	5	7.7
35: ≤ 40	3	4.6
$\bar{X} \pm SD$	31.26±4.58	
Gender:		
Male	0	0.0
Female	65	100.0
Marital status:		
Married	41	58.6
Divorced	2	2.9
Single	22	38.5
Previous attendance of training courses about trophic feeding :		
Yes	15	23.1
No	50	76.9

**Figure (1):** Distribution of The Studied Nurses According to Their Educational Level.

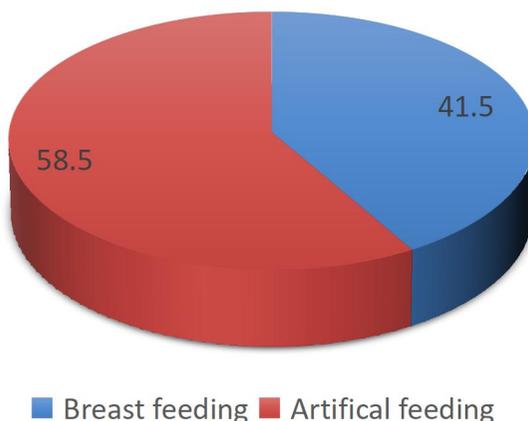


Figure (2): Distribution of Premature Infants According to Content of Trophic Feeding at NICUs.

Table (2): Distributions of The Studied Nurses According to Their Total Knowledge about Trophic Feeding of Preterm Infants in Neonatal Intensive Care Units (n=65):

Total knowledge	N	%
Good	16	24.6
Average	21	32.3
Poor	28	43.1
Total	65	100

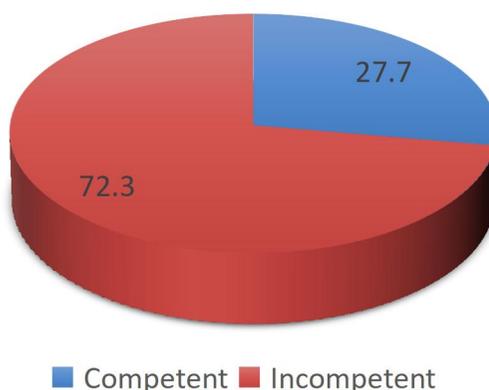


Figure (3): Total Nurses Practices About Trophic Feeding of Preterm Infants at NICUs

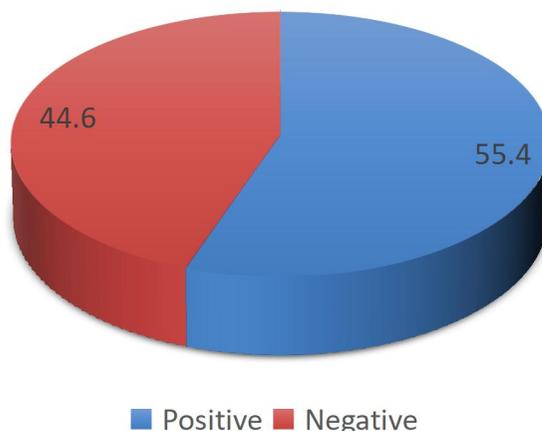


Figure (4): Distributions of Total Nurses' Attitude Regarding Trophic Feeding of Preterm Infants at Neonatal Intensive Care Units (n=65).

Table (3): Relation between The Studied Nurses' Characteristic & Their Knowledge Regarding Trophic Feeding at NICUs (n=65).

Nurses' Characteristics	Total knowledge						Chi-Square	
	Good		Average		Poor		X ²	P-value
	N	%	N	%	N	%		
Age								
20 : < 25	4	10.0	12	30.0	24	60.0	34.453	<0.001*
25 : < 30	4	23.5	9	52.9	4	23.5		
30 : < 35	5	100.0	0	0.0	0	0.0		
35 or more	3	100.0	0	0.0	0	0.0		
Marital status								
Married	13	31.7	12	29.3	16	39.0	5.364	0.252
Divorced	0	0.0	0	0.0	2	100.0		
Single	3	13.6	9	40.9	10	45.5		
Educational Qualification								
Diploma of Nursing	1	25.0	1	25.0	2	50.0	6.455	0.168
Bachelor of Nursing	2	100.0	0	0.0	0	0.0		
Health Technical Institute	13	22.0	20	33.9	26	44.1		
Years of Experience								
<5	2	5.9	8	23.5	24	70.6	49.292	<0.001*
5 : <10	2	11.8	11	64.7	4	23.5		
10 : <15	8	80.0	2	20.0	0	0.0		
15 or more	4	100.0	0	0.0	0	0.0		
Pervious Attendance of Training Courses about Trophic Feeding								
Yes	11	73.3	3	20.0	1	6.7	25.718	<0.001*
No	5	10.0	18	36.0	27	54.0		

Table (4): Relation between The Studied Nurses' Characteristic & Their Total Practice Regarding Trophic Feeding at NICUs (n=65)

Nurses' Characteristics	Total practice					
	Competent		Incompetent		Chi-Square	
	N	%	N	%	X ²	P-value
Age						
20 : < 25	4	10.0	36	90.0	27.632	<0.001*
25 : < 30	6	35.3	11	64.7		
30 : < 35	5	100.0	0	0.0		
35 or more	3	100.0	0	0.0		
Marital status						
Married	15	36.6	26	63.4	4.556	0.102
Divorced	0	0.0	2	100.0		
Single	3	13.6	19	86.4		
Educational Qualification						
Diploma of Nursing	2	50.0	2	50.0	6.679	0.035*
Bachelor of Nursing	2	100.0	0	0.0		
Health Technical Institute	14	23.7	45	76.3		
Years of Experience						
<5	2	5.9	32	94.1	46.786	<0.001*
5 : <10	2	11.8	15	88.2		
10 : <15	10	100.0	0	0.0		
15 or more	4	100.0	0	0.0		
Pervious attendance of training courses about trophic feeding						
Yes	12	80.0	3	20.0	26.645	<0.001*
No	6	12.0	44	88.0		

Table (5): Correlation Between Total Nurses' Knowledge, Practices and Attitude Regarding Trophic Feeding at NICUs.

	Total knowledge score		Total practice score	
	R	P-value	R	P-value
Total practice	0.427	<0.001*		
Total attitude	0.384	<0.001*	0.425	<0.001*

Discussion

The health care professional in general and nurses in particular play a vital role to ensure that the preterm infants have the best possible beginning of life and the nurses must be aware of the potential problems and be alert to the premature changing condition to intervene appropriately when necessary. The nurses are the first health care providers who have direct contact with the preterm infants at NICUs. Hence, nurses required knowledge and skills to take care of the preterm infants keeping in mind the basic principles. So that, many complications can be prevented. NICUs nurses should have enough experiences in feeding small preterm infants and play important roles to prevent any feeding problems (UNICEF and WHO, 2018).

Regarding total knowledge of the studied nurses about trophic feeding of preterm infants in neonatal intensive care units the current study results reported that, the minority only of studied nurses had good knowledge regarding trophic feeding at NICUs, while about one third of them had average knowledge. On the other hand, more than two fifths of them had poor knowledge (Table 2)

From the researcher point of view, this limitation of nurses' knowledge at this critical area might be because, lack of refreshment of the nurses' knowledge. Moreover, the nurses in Egypt are not used the independent self-learning. Another cause for lack of knowledge is the nurses' exhaustion due to increased workload, which may hinder their ability

to read and update their knowledge and skills.

The present study results were disagree with **Aisa & Abbas, (2019)** who mentioned that, most of the studied nurses were knowledgeable as regards trophic feeding. Also contrast with **El-Morsy et al., (2020)** who applied study entitled "The Effect of Implementing a Guideline Protocol on Nurses' Knowledge about the Nutritional Requirements of Low Birth-Weight Infants" and found that, more than half of the studied nurses had insufficient knowledge about nutritional requirements of low birth weight infants, pre implementation of guideline protocol. While, all of the studied nurses had a sufficient knowledge post implementation of guideline protocol. Additionally disagree with **Buloz (2021)** who noted that, the studied nurses had an acceptable level of knowledge about trophic feeding.

Regarding total nurses practices about trophic feeding of preterm infants at NICUs, the current study results mentioned that, more than one quarter of total actual nurses practices regarding trophic feeding at NICUs were competent while, less than three quarters of them were incompetent (Figure 3). This result could be due to that the studied nurses having poor knowledge and practice to ensure satisfactory outcomes and provide high quality nursing care for preterm infants on trophic feeding.

The current study result in accordance with **Mahmoud et al., (2018)** who conducted a study entitled "Quality of Nurses' Performance Regarding Parenteral Nutrition at Neonatal Intensive

Care Units" and represented that highly percentage of the studied nurses had incompetent in their total performance score for enteral feeding.

The present study result in contrasted with **Gomaa et al., (2022)** who demonstrated that more than half of the studied nurses had satisfactory practices regarding enteral feeding of high-risk neonates and less than half had unsatisfactory practice. Also, **Abo Elezz et al., (2021)** who applied study about "Assessment of Nursing Performance toward Enteral Feeding at Pediatric Critical Care Units" and found that less than three-quarters of the studied nurses had a competent total level of practice regarding enteral feeding in the pediatric critical care unit.

From the researcher point of view, lack of training, lack of continuous in service training programs, lack of motivation to learn or take training courses and these poor level prevent premature infant to receive standardized level of care and prevent them from maximizing chance of survival.

Regarding total nurses' attitude regarding trophic feeding of Preterm infants at neonatal intensive care units the current study result illustrated that, more than half of the studied nurses had positive attitude regarding the trophic feeding at NICUs, while less than half of them had negative attitude (Figure 4)

From the researcher point of view, nurses' knowledge about trophic feeding is important where, knowledge is a foundation on creating nurses practices

and attitudes on performing trophic feeding fast and right

The preset study result goes on the same line with **Buloze (2021)** who mentioned that, the studied nurses had a positive attitude regarding trophic feeding of preterm infant. Also supported with **Hassan (2014)** who studied the "Effect of Training Program on Nurses' Knowledge, Attitude and Practices regarding Neonatal Nursing Care in Obstetrics and Gynecology and Pediatric" and found that, nearly half of nurses responded with positive attitude regarding nutrition of preterm infant. Additionally in agreement with **Hamdan et al., (2022)** who conducted a study entitled "Palestinian nurses' Knowledge, Attitudes, and Practices regarding Enteral nutrition" and noted that, nurses attitudes were positive towards enteral nutrition.

Concerning relation between the studied nurses' characteristic & their knowledge regarding trophic feeding at NICUs the present study results portayed that, there was highly statistically significant difference between nurses knowledge, age, years of experience and previous attendance of training courses about trophic feeding with $p\text{-value} < 0,001$ while, there was no statistical significant difference between nurse knowledge their marital status and educational qualifications (Table 3).

The present study results were in disagreement with **El-Morsy et al., (2020)** who mentioned that, there was no relation between characteristics of the studied nurses and their total knowledge about trophic feeding of low birth weight

infants, pre and immediately post implementation of guideline protocol, except in relation to nurses' level of education, and their knowledge level pre implementation of guideline protocol.

Concerning the relation between the studied nurses' characteristic & their total practice regarding trophic feeding at NICUs the current study results showed that, there were highly statistically significant differences between nurses total practices and their age, years of experience and training courses. Also, there were statistically significant differences between total practices with their educational qualifications when p-value was <0.05 . While there was no statistical significant difference between nurses practices and marital status (Table 4).

The present study results goes in the same line with **Ebrah & Yousif, (2020)** who mentioned that, there was a statistically significant correlations between the level of experience and the practical skills, while in disagreement in relation between practice and level of qualification, there was no statistical significant relationship between level of nurses' practical skills and level of qualification.

As regard correlation between total nurses' knowledge, practices and attitude regarding trophic feeding at NICUs. The present study result revealed that, there were highly statistically significant differences with positive correlations between knowledge, total practices and total attitude (Table 5).

The present study result was in accordance with **Shahin et al., (2012)** who applied a study entitled "Nurses Knowledge and practices regarding Enteral Nutrition at the Critical Care Department of Al-Manial University Hospital in Egypt" and found that, there was a statistical significant correlation between participants' scores of knowledge and practice in pre-program and post program. Also, agree with **Hamdan et al., (2022)** who mentioned that, that the nurses' knowledge score is associated with nurses' attitudes and illustrated that nurses' knowledge score is related to certain nurses' practices. Additionally supported with **Ebrah & Yousif, (2020)** who mentioned that, there is a positive Pearson Correlation between the nurse's knowledge scores and the practical skills.

Conclusion

The current study concluded that, less than half of the studied nurses had poor level of knowledge, more than two thirds of them had incompetent level of practices and more than half had positive attitudes regarding trophic feeding of preterm infants at neonatal intensive care units. Furthermore, there were highly statistically significant differences with positive correlations between knowledge, total practices and total attitudes.

Recommendations

Based on the current study findings, the following recommendations are suggested:

- Raising awareness of nurses about trophic feeding for preterm infants and availability of procedure book about trophic feeding for preterm infants.

- Neonatal intensive care units should include updated policies related to trophic feeding for preterm infants.
- Training programs should be applied for nurses in the neonatal intensive care units to improve their knowledge and practice regarding trophic feeding for preterm infants.
- Neonatal intensive care nurses must be encouraged to attend refreshing courses and workshops about trophic feeding for preterm infants and importance of breast milk expression to initiate trophic feeding instead of artificial milk.
- Periodical follow-up for neonatal nurses practices about encouraging mothers to express breast milk, how to store it to enhance trophic feeding of preterm infants.
- Further researches are required involving larger study sample of nurses and preterm infants at different study settings, all over Egypt, in order to generalize the results.

References

- Abo Elezz, H.M., Adly, R.M. & Tantawi, H.R. (2021):** Assessment of Nursing Performance toward Enteral Feeding at Pediatric Critical Care Units. *Egyptian Journal of Health Care*, 12(4), 1159-1178.
- Aisa, A.B. & Abbas, A.A. (2019):** Assessment of Nurses' Knowledge regarding Preterm Infant Feeding Skills at Khartoum Teaching Hospital (Sudan). *African Journal of Medical Sciences*, 4(3).
- Aliakbari Sharabiani, B. (2017):** Nasogastric tube placement errors and complications in pediatric intensive care unit: a case report. *Journal of Cardiovascular & Thoracic Research*, 3 (4): 133-134.
- Amsalu, R., Oltman, S.P., Baer, R.J., Medvedev, M.M., Rogers, E.E. & Jelliffe-Pawlawski, L. (2022):** Incidence, risk factors, and reasons for 30-day hospital readmission among healthy late preterm infants. *Hospital Pediatrics*, 12(7), 639-649.
- Birhanu, D., Gebremichael, B., Tesfaye, T., Tadesse, M., Belege, F., Godie, Y. & Tamiru, E. (2022):** Survival status and predictors of mortality among preterm neonates admitted to neonatal intensive care unit of Addis Ababa public hospitals, Ethiopia, 2021. A prospective cohort study. *BMC pediatrics*, 22(1), 1-12.
- Breintoft, K., Arendt, L.H., Ulbjerg, N., Glavind, M.T., Forman, A. & Henriksen, T.B. (2022):** Endometriosis and preterm birth: A Danish cohort study. *Acta Obstetrica et Gynecologica Scandinavica*, 101(4), 417-423
- Buck, C.O. & Montgomery, A.M. (2022):** Long-Term Impact of Early Nutritional Management. *Clinics in Perinatology*, 49(2), 461-474.
- Buloze, F. (2021):** Nurses' Knowledge, Attitudes and Practices regarding feeding of low and very low birth weight infants: a cross-sectional

- study at tertiary referral hospitals in Rwanda (Doctoral dissertation, University of Rwanda).
- Ebrah, H.M. & Yousif, K.I. (2020):** The Effect of Intervention on Nurse's Performance Regarding Feeding of Premature Baby in Neonate Care Unit at Public Hospitals in Hodeida City: Yemen. *Open Journal of Pediatrics*, 10(04), 695.
- Elhusein A., Rshad, H., Dabash, S., El-Saman, G. & EzzEl-Din, Z. (2015):** Early versus Late Trophic Feeding: Effect on Health Status of Low Birth Weight Neonates. *Journal of Biology, Agriculture and Healthcare*; 5 (18): 7-17.
- El-Morsy, H.S., El-Sayed, R.H. & Abd El Aziz, M.A. (2020):** The effect of implementing a guideline protocol on nurses' knowledge about the nutritional requirements of low birth-weight infants. *Am J Nurs Res*, 8(1), 9-17.
- Foote, J.M., Hanrahan, K., Mulder, P.J., Nielsen, A.K., Perkhounkova, Y., Hein, M. & McCarthy, A.M. (2020):** Growth measurement practices from a national survey of neonatal nurses. *Journal of Pediatric Nursing*, 52, 10-17.
- Gomaa, Z., Ahmed, S.M. & Aboelmagd, A.N. (2022):** Nurses' Knowledge & Practices toward Enteral Feeding and its effect on selected High-Risk Neonates' Outcomes. *Minia Scientific Nursing Journal*, 72-79.
- Hamdan, M., Zidan, S., Badrasawi, M., Shweikeh, H., Al-Masri, R. & Al-Khateeb, R. (2022):** Palestinian nurses' knowledge, attitudes, and practices regarding enteral nutrition: Cross-sectional study. *Applied Nursing Research*, 63, 151545.
- Hassan, A.I. (2014):** Effect of the Training Program on Nurses' Knowledge, Attitude and Practice regarding Neonatal Nursing Care in Obstetrics and Gynecology and Pediatric Teaching Hospitals at Wad Medani, Gezira State, Sudan (2010-2013) (Doctoral Dissertation, University of Gezira).
- Mahmoud, N.A., Mahmoud, F.Sh. & Khalaf, S.M. (2018):** Quality of Nurses' Performance Regarding Parenteral Nutrition at Neonatal Intensive Care Units. *Egyptian Journal of health care*, 9(2), 116-128.
- Mustapha, M., Wilson, K.A., & Barr, S. (2021):** Optimising nutrition of preterm and term infants in the neonatal intensive care unit. *Paediatrics and Child Health*, 31(1), 38-45.
- Ramaswamy, V.V., Bandyopadhyay, T., Ahmed, J., Bandiya, P., Zivanovic, S. & Roehr, C.C. (2021):** Enteral feeding strategies in preterm neonates \leq 32 weeks gestational age: A Systematic review and network meta-analysis. *Annals of Nutrition and Metabolism*, 1-17.

- Shahin, M., Mohamed, W.Y., & Sayed, M. (2012):** Nurses knowledge and practices regarding enteral nutrition at the critical care Department of Al-Manial University Hospital in Egypt: impact of a Designed Instructional Program. *Journal of American Science*, 8(11), 397-404.
- Specht, R.P., Barroso, L.N., Machado, R.M., Santos, M.D., Ferreira, A.A., Chacon, I. & Padilha, P.C. (2022):** Enteral and parenteral nutrition therapy for neonates at a neonatal unit: a longitudinal retrospective study. *The Journal of Maternal-Fetal & Neonatal Medicine*, 35(17), 3323-3329.
- Tongo, O.O., Olwala, M.A., Talbert, A.W., Nabwera, H., Akindolire, A.E., Otieno, W. & Allen, S. (2022):** Enteral Feeding Practices for Very Preterm and Very Low Birth Weight Infants in Nigeria and Kenya. *Frontiers in pediatrics*, 10, 892209.
- UNICEF and WHO (2018):** Neonatal Care Clinical Guidelines. World Health Organization and UNICEF: The Kingdom of Eswatini. 180
- Yoshida-Montezuma, Y., Stone, E., De - Rubeis, V., Andreacchi, A.T., Keown-Stoneman, C. & Anderson, L.N. (2022):** The association between late preterm birth and cardiometabolic conditions across the life course: A systematic review and meta-analysis. *Paediatric and perinatal epidemiology*, 36(2), 264-275.