

Effect of Designed Nutritional Guidelines on Nurses' Performance regarding Feeding of Low-Birth-Weight Infants

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Abstract

Background: Low birth weight is one of the most serious challenges in maternal and child health in both developed and developing countries. **Aim of the study:** The study aimed to evaluate the effect of designed nutritional guidelines on nurses' performance regarding feeding of low birth weight infants. **Design:** A quasi-experimental design was used in the current study. **Settings:** This study was conducted at Neonatal Intensive Care Unit at Benha University Hospital and Benha Specialized Pediatric Hospital at Benha city. **Sample:** A convenient sample of nurses included (80) nurses working in the previous mentioned settings and a purposive sample(80) of low birth weight infants. **Tools of data collection:** Three main tools were used, tool I: A structured interviewing questionnaire. tool II: Observational check lists. tool III: Neonatal medical assessment sheet. **Results:** More than half of nurses had unsatisfactory level of knowledge and more than one third of them had incompetent level of practices before designed guidelines intervention, while the majority of nurses had satisfactory knowledge and of them had competent level of practice after designed guidelines intervention. **Conclusion:** The designed nutritional guidelines was effective in improving nurses' knowledge and their practices level regarding feeding low birth weight infants and improving physiological status of low birth weight infants. **Recommendations:** Provision of continuous designed guidelines in order to update nurses' knowledge and enhance their practices related to feeding of low birth weight infants.

Key words: Designed nutritional guidelines, Feeding, Low birth weight infants and Nurses' performance.

Introduction

Birth weight is a reliable and sensitive indicator for predicting the immediate and long health outcome of the newborn. It is the most important factor determining the survival chances of the newborn. Low Birth Weight infants (LBW) are four times more likely to die from common childhood diseases in the first year of life, when compared with their normal counterparts. The lower the birth weight is, the lower the survival chance of the infant. In addition there is also an emerging evidence that low birth weight infants are more prone to diabetes mellitus, hypertension and coronary artery disease in later life. Thus early identification of the LBW infants is essential for any intervention to improve

their chances of survival. Around 20 million infants are born each year (Falcão et al., 2020).

Low birth weight is a major risk factor for morbidity and mortality of infants. The major causes of death of LBW are prematurity, infection, hypothermia and inadequate breast feeding. Therefore, LBW infants are still being a major problem contributing to the high infant mortality rate. Every year many of medically immature infants spend their first few days or weeks or months of life in Neonatal Intensive Care Unit (NICU) because of the problems caused by their incomplete growth and development in uterus. Researchers have documented the greater risk of developmental outcomes of the low birth

weight infants, e.g. brain injury such as hypoxic ischemic encephalopathy, seizures and intra ventricular hemorrhage have been associated with neuro, motor and cognitive abnormalities (**Mohammed, 2020**).

World Health Organization (WHO) defined LBW as any neonate weight at birth less than 2500grams regardless to gestational age. Subcategories of LBW include Very low birth weight, which is less than 1500 grams and extremely low birth weight, which is less than 1000 grams. LBW is either caused by preterm birth which is commonly defined as neonate gestational age younger than 37 weeks or the infant being small for gestational age that is a slow prenatal growth rate or a combination of both (**Bhimwal et al., 2017**).

The causes of low birth weight infant included many interrelated factors both maternal and fetal. Factors that prevent normal circulation across the placenta cause poor nutrient and oxygen supply to the fetus, restricting growth. Weight at birth is directly influenced by general level of health status of the mother. Maternal environment is the most important determinant of birth weight, and that include inadequate prenatal care, teen mothers (less than 20 years old) or older mothers (more than 35 years), perceived maternal stress, multiple birth, low family income, cigarette smoking, alcohol consumption, cocaine use during pregnancy, mothers having hypertension or diabetes, previous delivery of a low birth weight infant, occupational and environmental exposures, physical harm from injuries (**Talie et al., 2019**).

Low birth weight infants are at high risk for early growth retardation, infectious disease, developmental delay and death during infancy and childhood. Countries can substantially reduce their infant mortality rates by improving the care of LBW infants.

Experience from developed and low- and middle-income countries has clearly shown that appropriate care of LBW infants, including feeding, temperature maintenance, hygienic cord and skin care, and early detection and treatment of complications, can substantially reduce mortality in this highly vulnerable group. The best feeding is one of the first interventions for low birth weight infants and associated with reduced case fatality in hospitals before the advent of intensive care (**Bater et al., 2020**).

The major goal of optimal nutrition of LBW infants is to improve their immediate survival and achieve optimal short-term and long-term growth and development. While deciding the feeding approach, the weight and the maturity of the infant should be taken into consideration. The objective of nutritional guidelines is to improve the quality of care received by LBW infants through improved capacity of health workers (**Lee et al., 2018**).

The evidence-based oral feed advancement guidelines in the (NICU) helps to minimize variation in feeding practices, promote shortened transition times from gavage to oral feeding, increase bottle-feed quality, and decrease the length of stay in the NICU. The benefits of these guidelines lies in the fact they offer comprehensive nutritional support through a combination of early TPN and early enteral feeding, followed by a steady decrease in TPN as the amount of enteral feed then increased gradually (**Paul et al., 2018**).

Nurses play an important role in providing care for LBW infants at NICU. The nurse should weight LBW infant at the same time every day on the same scale to determine excessive weight loss early, in addition continuous assessing of infant's sucking pattern to observe any ineffective patterns. Record growth by plotting daily

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weight and weekly measurements of body length and head circumference (Cetinkaya & Kusdemir, 2018).

Significance of the study

Low birth weight is one of the greatest serious challenges for maternal and infant health in each developed and developing countries. According to WHO 2018 report, 20 million infants are born low birth weight every year and it is a huge burden of morbidity and mortality for world's health (World health organization, 2018).

Optimal nutrition is the key for survival, prevention of adverse outcomes such as sepsis and reducing the length of stay in hospital. In addition, there is strong evidence that early nutrition affects multi organ developmental patterning, immune, cardiac and respiratory function and long term cognitive outcome. From this point of view, the researcher found urgent to provide nutritional guidelines to improve NICU nurses performance regarding feeding of LBW infants.

Aim of the study

The aim of this study was to evaluate the effect of designed nutritional guidelines on nurses' performance regarding feeding of low birth infants. regarding feeding of low birth weight infants.

Research Hypothesis:

- Nurses was expected to have satisfactory knowledge and competent practices regarding feeding low birth weight infants after implementation of designed nutritional guidelines .
- Physiological status of low birth weight infants was expected to be improved after implementation of designed nutritional guidelines.

Subjects and Method

Research design :

A quasi experimental research design was utilized to conduct this study

- Research Settings:

The current study was conducted at NICU at Benha University Hospital and Benha Specialized Pediatric Hospital which is affiliated to Egyptian Ministry of Health and Population.

Research Subject:

-A convenience sample of 80 nurses from the previous mentioned settings were selected regardless their personal characteristics.

- A purposive sample (80) of low birth weight infants from the previously mentioned settings under the following

inclusion criteria:

Low birth weight infants (with body weight less than 2500 grams).

Free from any congenital anomalies.

Not on ventilator and with no surgery.

Tools of Data Collection:

Data were gathered by using the following three tools:

Tool (I): A Structured Interviewing Questionnaire format (pre & post):

It was designed by the researcher in the light of the current relevant researches and literature, and consisted of two parts:

1- Part (I):- Personal characteristics of the studied nurses; age, gender, work place, level of education, years of experience and attending of previous training courses about care of low birth weight infants. This part consisted of 7 questions.

2- Part (II):- Nurses' knowledge regarding feeding of low birth weight infants and consisted of two parts:

Part (a): Knowledge regarding low birth weight and it composed of 4 multiple choice questions

Part (b): knowledge regarding feeding of low birth weight and it composed of 36 multiple choice questions.

Nurses' knowledge scored as following:

The total knowledge scores was categorized as, the complete correct answer had score (2), incomplete correct answer had score (1) and wrong /don't know had score (0). According to nurses' response, total knowledge scores ranged from (0-80) point and was categorized as satisfactory if nurses scored $\geq 85\%$ were ranged from 68-80 point) and $< 85\%$ was considered unsatisfactory knowledge (<68 point).

Tool (II):- Nurses' observational checklists: It was adopted from **Dutta et al., (2015) and Nishant et al., (2020)** to assess nurses' practices regarding feeding of low birth weight infants. It was used twice before and immediately after the implementation of designed guidelines. This tool included (153steps) grouped under (13) main skills as the following: Hand washing (14steps). Formula preparation(24 steps). Nasogastric tube placement(10 steps). Nasogastric tube feeding(10 steps). Measuring axillary temperature (13 steps). Measuring apical pulse (11 steps). Measuring respiration (7 steps). Measuring blood pressure (14 steps). Measuring length(10 steps). Measuring weight (15 steps). Measuring head circumference (10 steps). Measuring chest circumference (9 steps). Measuring abdominal circumference (6 steps).

Scoring system for nurses' practice:

The studied nurses' actual practices were checked with the observational checklists where (1) score was given for each step done correctly and (0) score for step not done correctly or not done. Accordingly, the level of nurses' actual practices was categorized as the following: competent level was

categorized $\geq 85\%$ were ranged from 130-153 point) and incompetent level $< 85\%$ (< 130 point).

Tool (III): Neonatal medical assessment sheet which included two parts :

Part one: Neonatal characteristics; gestational age, gender, current age, admission weight, current weight, weight on discharge, height, head circumference and abdominal circumference.

Part two: Neonatal medical data; medical diagnosis, type of feeding and amount of feeding, frequency of feeding and physiological parameters.

Content validity:

Tools of data collection were investigated for their content validity by a panel of three experts in Pediatric Nursing specialty from the Faculty of Nursing Benha University, who were selected to test the content validity of the tools and to judge its clarity, relevance, comprehensiveness, understanding, and applicability. The opinions were elicited regarding the layout, the format, and the sequence of the questions, and all of their remarks were taken into consideration. The tools were regarded as valid from the experts' point of view.

Reliability of the tools:

The researcher applied the reliability of tools for testing their internal consistency by administrating the same tool to the same subjects under similar conditions. Internal consistency reliability of all the tools items was assessed using Cronbach's alpha coefficient. Internal consistency of knowledge was $\alpha=0.81$ and the internal consistency of practice was $\alpha= 0.79$.

Ethical Considerations :

The study was approved by the Ethics Committee at the Faculty of Nursing, Benha University. The researcher clarified the aim

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of the study and the expected outcomes to all the studied nurses during the initial interview. Verbal approval was requested to participate in the current study. The studied nurses were assured that all information would be confidential and their participation in the study was voluntary without any costs, and any observations were not required for job evaluation. Additionally, nurses were allowed to withdrawal from the study at any time without giving any rational. Confidentiality of the gathered data and results was secured. Official permission was obtained from the Dean of the Faculty of Nursing at Benha University and the directors of Benha university hospital and Benha specialized pediatric hospital to collect the data.

Pilot Study:

The researcher conducted a pilot study to test the clearness and applicability of the study tools as well as to estimate the time needed for each tool. The pilot study was conducted on 10% of the total studied subject (8) low birth weight infants and (8) nurses who were included in the present study. No modifications were done, and the last form was developed. This phase took one month.

Field Work:

The following phases were carried out to achieve the aim of the current study, assessment, planning, implementation, and evaluation phases. The researcher conveyed these phases from the earliest starting point of June 2021 to the end of December 2021, covering seven months.

1- Assessment phase: The assessment phase involved interviews with nurses involved in the study to collect baseline data. First, the researcher visited Benha University Hospital and Benha specialized pediatric

hospital three days/week (Saturday, Monday, Wednesday) by rotation from 10 AM and extended to 2 PM in the morning shift and from 3 PM to 6 PM in the afternoon shift. At the beginning of the interview, the researcher welcomed nurses, explained the purpose, duration and activities of the study and took their oral approval to participate in the study before data collection. After that, the researcher gave the studied nurses a structured interviewing questionnaire sheet (**Tool I**) in order to fill to assess the nurses' knowledge regarding feeding of low birth weight infants. It took nearly 15 minutes. Then, each nurse was observed separately during their actual practices of procedures to assess their practices by using observational checklists (**Tool II**). It took nearly from 15 to 30 minutes. Finally, the researcher collected the infant's medical assessment sheet from medical hospital records (**Tool III**). This phase took around two months.

2-Planning phase:

Based on baseline data obtained from the assessment phase and relevant literature reviews, the designed guidelines were developed by the researcher in simple Arabic booklet according to the studied nurses' needs. The designed guidelines were constructed, revised, and modified from the related literatures to improve the nurses' knowledge and actual practices regarding feeding of low birth weight infants. Moreover, the researcher used different methods of teaching as modified lectures, group discussions, brainstorming and demonstration, and re-demonstration. Different media was used for data presentation as booklets and real situations.

Implementation phase:

The implementation phase was achieved through sessions: each session started with a

summary of the previous session and the objectives of the new one. However, the researcher took into consideration the use of the Arabic language that suited all nurses' educational levels and the attention span of nurses. Moreover, the researcher used motivation and reinforcement as giving gifts during sessions to enhance sharing in the study. The researcher was available at the study settings 3 days/week. The studied nurses were divided into 16 groups: each group consisted of 5 nurses. The total number of sessions was nine sessions distributed as the following: (3) sessions for the theoretical part: each session kept going for 30- 45 minutes, and (6) sessions for the practical part: each session kept going for 60 minutes and were repeated to each group. This phase took around 3 months

4- Evaluation phase:

After the implementation of the designed guidelines the researcher carried out a post-test immediately to assess nurses' knowledge and actual practices by using the same format of pre-test to evaluate the effect of the implementation of designed guidelines on nurses' performance regarding feeding low birth weight infants. This phase took around one month.

Statistical Analysis:

The collected data were organized, tabulated, and statistically analyzed using Statistical Package for Social Science (SPSS) version 20 for windows, running on IBM compatible computer. Data were presented using descriptive statistics in the form of numbers and percentages for qualitative variables and mean and standard deviation for quantitative variables, and mean and standard deviation for quantitative variables. Quantitative continuous data were compared using paired t test in case of comparison between two groups. Qualitative variables were compared using Chi-square

test (χ^2). was used to measure the importance of, and correlation coefficient (r) was used for quantitative variables that were normally distributed. Pearson coefficient test was used to correlate between two normally distributed quantitative variables.

Results

Table (1): Showed that, less than half (47.5%) of the studied nurses their age ranged between 20 < 30 years with ($\bar{x} \pm SD$ 32.02 \pm 4.42 years) and their academic qualification is Bachelor of Nursing. Regarding nurses' job title, the majority (81.2%) of them working as staff nurse, two fifths (40.0%) of them have 5- < 10 years of experience in the NICU with ($\bar{x} \pm SD$ 13.08 \pm 9.40 years) and all of them didn't attend training courses regarding care of low birth weight infants.

Table (2): Revealed that, less than half (42.5%) of the studied low birth weight infants their gestational age ranged from 28 to < 32 weeks, less than two third (60.00%) of them their current age ranged from 10 < 20 days, less than half (45.0%) of them their weight at birth ranged from 1.5 < 2 kg and their head circumference ranged from 30 < 32 cm, and more than one third (36.3%) of them their current weight ranged from 1.5 -2 kg. Moreover, more than half (58.7%) of them their length ranged from 45 < 50 cm and less than half (47.5%) their abdominal circumference ranged from 22 < 24 cm.

Figure (1): Illustrated that, more than half (56.2%) of studied nurses had unsatisfactory level of total knowledge pre designed guidelines intervention phase. While the majority (81.2 %) of them had satisfactory knowledge post designed guidelines intervention phase.

Figure (2): Showed that nearly two thirds (66.3%) of studied nurses had had competent level of total practices at pre intervention which increased to 90.0% post intervention

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phases. While more than one third (33.8%) of studied nurses had incompetent level of total practices at pre intervention and then this percentage decreased to 10.0% post intervention phases.

Table (3): Clarified that, there was a highly statistically significant relation between total knowledge score of the studied nurses and their personal characteristics (age, academic qualification and years of experience) at pre-intervention phase ($P < 0.001$) compared to no statistically significant relation at post-intervention phase ($P > 0.05$).

Table (4): Clarified that, there was a highly statistically significant relation between total practices score of the studied nurses and their personal characteristics (age, academic qualification and years of experience) at pre designed guidelines intervention phase ($P < 0.001$) compared to no statistically significant relation at post designed guidelines intervention phase ($P > 0.05$).

Table (5): Clarified that, there was a positive correlation and highly statistical significance between total knowledge and total practice scores at pre and post designed guidelines intervention phase ($p < 0.000$).

Table (1): Distribution of the studied nurses according to their personal characteristics (n=80).

personal characteristics	No	%
Age (Years)		
<20	5	6.3
20 < 30	38	47.5
30 < 40	24	30.0
≥40	13	16.2
Mean ±SD	32.02±4.42	
Academic qualification		
Secondary school nursing education	10	12.5
Technical Institute of Nursing	29	36.3
Bachelor of Nursing science	38	47.5
Postgraduate studies in Nursing science	3	3.7
Job		
Staff nurse	65	81.2
Nursing supervisor.	15	18.8
Years of experience in (NICU)		
< 1	3	3.7
1 < 5	15	18.8
5- < 10	32	40.0
≥10	30	37.5
Mean ±SD	13.08±9.40	
Attended training courses regarding care of low birth weight infants		
Yes	0	
No	80	100.0

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Table (2): Distribution of the studied low birth weight infants according to their personal and medical data (n=80)

Items	No	%	Mean ±SD
Gestational age (week)			
< 28	20	25.0	31.22±2.12week
28:< 32	34	42.5	
32: < 36	17	21.3	
36: ≤ 40	9	11.2	
Current age (days)			
1 < 10	20	25.0	18.03±6.05days
10 < 20	48	60.0	
20-30	12	15.0	
Weight at birth (kg)			
<1	18	22.5	1.35±0.05kg
1: < 1.5	12	15.0	
1.5: < 2	36	45.0	
2: ≤ 2.5	14	17.5	
Current weight (kg)			
<1	13	16.2	1.62±0.07kg
1:<1.5	10	12.5	
1.5 : < 2	29	36.3	
2: ≤ 2.5	28	35.0	
Head circumference (cm)			
< 30	25	31.3	30.07±0.26cm
30: < 32	36	45.0	
32: ≤ 34	19	23.7	
Items			
Length (cm)			
<40	8	10.0	39.96±0.43cm
40:<45	22	27.5	
45: < 50	47	58.7	
50: ≤ 55	3	3.8	
Abdominal circumference (cm)			
18: < 20	7	8.7	19.22±0.42cm
20: < 22	29	36.3	
22: < 24	38	47.5	
24: ≤28	6	7.5	
Methods of feeding			
	No	%	
Oral feeding	0		100.0
Oral and gastric tube feeding	0		
Gastric and parental nutrition	80		

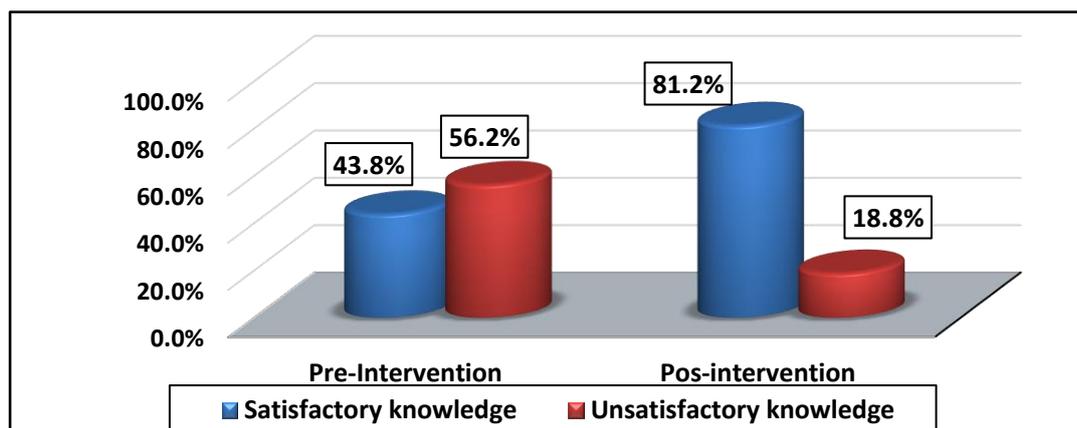


Figure (1): Total nurses' knowledge score at pre and post designed guidelines intervention phases (n = 80)

Table (3): Relation between total knowledge scores of studied nurses and their personal characteristics at Pre and Post designed guidelines intervention phases (n=80).

Personal characteristics	Total knowledge										x ²	P-value		
	pre-intervention					post-intervention								
	Satisfactory knowledge (n=35)		Unsatisfactory knowledge (n=45)		x ²	P-value	Satisfactory knowledge (n=65)		Unsatisfactory knowledge (n=15)				x ²	P-value
	No	%	No	%			No	%	No	%				
Age (years) :														
<20	1	2.9	4	8.9	39.2	0.000	3	4.6	2	13.3	2.7	0.43		
20 < 30	4	11.4	34	75.6			30	46.2	8	53.3				
30 < 40	19	54.3	5	11.1			20	30.8	4	26.7				
≥40	11	31.4	2	4.4			12	18.5	1	6.7				
Academic qualification														
Secondary school nursing education	2	5.7	8	17.8	21.9	0.000	7	10.8	3	20.0	4.6	0.19		
Institute of Nursing	5	14.3	24	53.3			21	32.3	8	53.3				
Bachelor of Nursing	25	71.4	13	28.9			34	52.3	4	26.7				
Postgraduate studies in pediatric nursing	3	8.6	0	0.0			3	4.6	0	0.0				
Years of experience in NICU														
< 1	0	0.0	3	6.7	19.7	0.000	2	3.1	1	6.7	4.0	0.25		
1 < 5	2	5.7	13	28.9			10	15.4	5	33.3				
5- < 10	11	31.4	21	46.7			26	40.0	6	40.0				
≥10	22	62.9	8	17.8			27	41.5	3	20.0				

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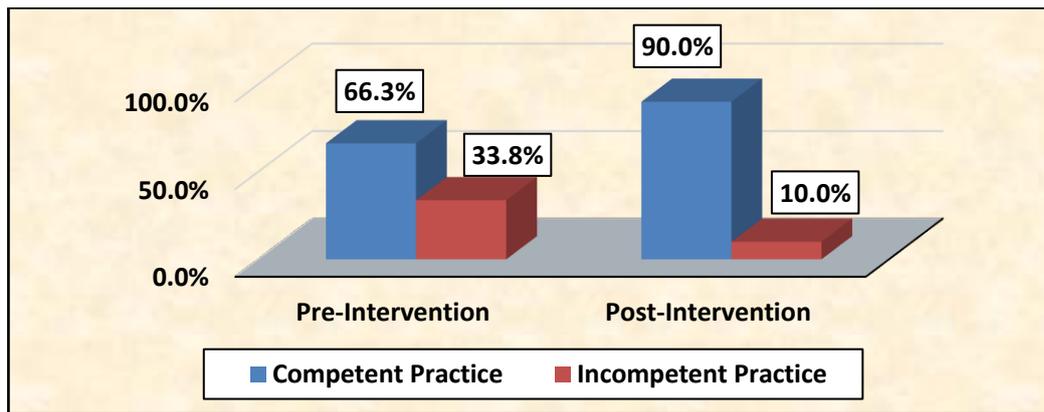


Figure (2): Total nurses' total practices score regarding feeding of low birth weight infants at pre and post designed guidelines intervention phases (n = 80).

Table (4): Relation between total practices scores of studied nurses and their personal characteristics at Pre and Post designed guidelines intervention phases (n=80).

Personal characteristics	Total practices										x ²	P-value		
	pre-intervention					post-intervention								
	Competent (n=53)		Incompetent (n= 27)		x ²	P-value	Competent (n=72)		Incompetent (n= 8)				x ²	P-value
	No	%	No	%			No	%	No	%				
Age(years):														
<20	2	3.8	3	11.1	20.7	0.000	3	4.2	2	25.0	5.9	0.11		
20 < 30	17	32.1	21	77.8			34	47.2	4	50.0				
30 < 40	23	43.4	1	3.7			23	31.9	1	12.5				
≥40	11	20.8	2	7.4			12	16.7	1	12.5				
Academic qualification														
Secondary school nursing education	3	5.7	7	25.9	15.8	0.001	7	9.7	3	37.5	5.7	0.12		
Institute of Nursing	15	28.3	14	51.9			26	36.1	3	37.5				
Bachelor of Nursing	33	62.3	5	18.5			36	50.0	2	25.0				
Postgraduate studies in nursing science	2	3.8	1	3.7			3	4.2	0	0.0				
Years of experience														
Less than a year	1	1.9	2	7.4	17.6	0.001	2	2.8	1	12.5	4.3	0.22		
1 < 5 years	4	7.5	11	40.7			12	16.7	3	37.5				
5- < 10 years	22	41.5	10	37			30	41.7	2	25.0				
≥10 years	26	49.1	4	14.8			28	38.9	2	25.0				

Table (5): Correlation coefficient between total knowledge and total practices scores of studied nurses at Pre and Post designed guidelines intervention phases (n=80)

Variables	Total knowledge			
	Pre-intervention		Post-intervention	
	r	P-value	r	P-value
Total practices	0.59	.000**	0.69	.000**

Discussion

Educational guidelines are important for nurses working at Neonatal Intensive Care Unit for providing standardized nursing care and achieve improvement in infant growth and developmental outcomes. It is essential that staff involved in caring for low birth weight infants is educated about care of low birth weight infants. Nurses need to confident and proficient in feeding low birth weight infants. Well- organized educational guidelines that enable nurses to provide, monitor and evaluate care and to continually improve their knowledge and enhancement their practices (Zhou et al., 2019).

Regarding general characteristics of the studied nurses as showed in table (1), it was cleared that less than half of them aged ranged from 20<30years with the mean age of them was 32.02±4.42 years. This finding agreed with Shoghi et al., (2020) which entitled " Knowledge and Attitude of Nurses Working in a Neonatal Intensive Care Unit on the Use of Human Donor Milk" who showed that, the mean age of the study nurses was 30.98±5.09 years. This result may be due to the nature of NICU as it considered a dynamic and fast moving environment which require more active and young nurses. Also, this could be due to the demanding nature of NICU service so that older nurses may find it difficult to

cope with the load of work required. While this finding was in disagreement with Phanase, (2019) which entitled "Effectiveness of Structured Teaching Programme (STP) on knowledge regarding care of low birth weight babies among staff nurses working at hospitals of Vidarbha region" who reported that, less than half of the studied nurses their mean age was 36.61±6.16 years.

Regarding years of experience of the studied nurses, the present study illustrated that, about two fifth of them have 5<10 years of experience. This finding agree with Bakhshi et al., (2018) which entitled "Impact of Instructions on the Developmental Status of Premature Infants on the Clinical Practice of Neonatal Intensive Care Unit Nurse " who reported that, the majority of studied nurses (97.6%) had 5-10 years of experience. This finding was disagreed with Sheikh, (2021) who conducted a study about "Pre-experimental study to assess the effectiveness of self- instructional module on knowledge regarding neonatal resuscitation among the staff nurses working in selected hospital " who reported that, more than half (51.7%) of nurses there years of experience was ranged from had 1-5 years of experience. From the researcher point of view, nurses in NICU require more years of experience to have good knowledge and practice regarding care of low birth weight infants, clinical experience

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provide an opportunity for nurses to expand their skills and knowledge to practice effective nursing care.

Concerning level of education of the studied nurses, the present study revealed that, less than half of them had Bachelors degree of Nursing science. This finding was in agreement with **El-Hamid et al., (2020)** who conducted a study about "Effect of Continuous Versus Intermittent Bolus Gavage Feeding on Gastrointestinal Tolerance, Physical and Physiological Parameters in Premature Infants" who illustrated that, more than one third of the studied nurses had nursing Bachelor's degree. This finding was in disagreement with **Mahmoud et al., (2018)** in a study entitled "Quality of Nurses' Performance Regarding Parenteral Nutrition at Neonatal Intensive Care Unit" who viewed that, more than half of the studied nurses had diploma of nursing (secondary school).

Regarding personal characteristics of the studied low birth weight infants as showed in table (2), the result of the current study revealed that, less than half of them their gestational age ranged from 28 to < 32 weeks with a mean gestational age 31.22 ± 2.12 weeks, this finding was agreement with **Parker et al., (2019)** who showed that, about half (50.0%) of infants their gestational age was 28 weeks. This finding also was agreed with **Fallahi et al., (2020)** who conducted a study about "The Effect of Breast Milk Cells on the Clinical Outcomes of Neonates With Birth Weight Equal to or Less Than 1800 Grams" who revealed that studied infants their mean gestational age was 30.79 ± 2.47 weeks. This finding was disagreed with **Dayanithi, (2018)** who conducted a study about "Low birth weight and premature births and their associated maternal factors" who founded that, half of LBW infants (50%) their gestational age was 37 weeks. Neonatal gestational age is

the primary indicator of the maturity of the neonates body systems and ability to adapt to the environment outside the uterus. In addition, the assessment of gestational age is an important criterion for the neonatal. Identification of the neonate at risk and predicting the ability to survive is based on gestational age as well as birth weight (**Hailu & Kebede, 2018**).

In relation to gender of the studied LBW infants, the current study revealed that, more than half of them were female. This finding was agreed with **Silveira et al., (2018)** who conducted a study about "Early intervention program for very low birth weight preterm infants and their parents" who showed that, about half of studied VLBW infants were female. This finding was disagreed with **Miao et al., (2019)** who conducted a study about "Birth weight percentiles by sex and gestational age for twins born in southern China" who illustrated that, more than half of LBW infants (52.3%) were male gender.

Concerning current age of studied LBW infants, the present study revealed that, less than two third of them their current age ranged from $10 < 20$ days and mean age of them 18.03 ± 6.05 days. This finding was agreed with **Salehi et al., (2015)** who conducted a study entitled "The effect of education and implementation of evidence-based nursing guidelines on infants' weight gaining in NICU" who clarified that, more than two thirds of the studied sample their current age ranged from 11- 20 days.

Concerning type of milk of the studied LBW infants the present study revealed that, the majority of them take artificial milk. This finding was in the same line with **Islam et al., (2018)** who founded that, two thirds (66.6%) of LBW infants feeding with artificial milk.

As regard to total level of nurses' knowledge showed in figure(1) the current study showed

that, more than half (56.2%) of studied nurses had unsatisfactory level of total knowledge pre designed guidelines intervention phase. While the majority (81.2 %) of them had satisfactory knowledge post designed guidelines intervention phase. This finding was in the same line with **Ebrah et al., (2020)** who showed that 53% of nurses had unsatisfactory level of total knowledge prior to the intervention. While the majority 95% of them had satisfactory knowledge after educational sessions

As regard to total level of nurses' practices showed in figure(2) the current study showed that, the majority of nurses had competent practices after designed guidelines implementation with highly statistical differences between pretest and post-test. This finding was matched with **Nandhini& Kanchana (2015)** in a study about "Effectiveness of Essential Pre-term Care Module on Knowledge and Skill among Nurses" who showed that, there was highly statistical differences in nurses practices between pretest and post-test .

Regarding relationship between the total level of nurses knowledge and their personal characteristics as showed in table(3), the present study showed that there was a highly statistical significant relation between total knowledge of nurses and years of experience before designed guidelines implementation. This could be due to nurses with increased years of experience proved to have better knowledge than those with shorter experience. This finding of the study was agreed with **Jose, (2017)** in a study about "Effect of Planned Teaching Programme on Knowledge of Immediate Care of Low Birth Weight Babies among Staff Nurses Working in Neonatal Intensive Care Unit in Selected Hospitals of an Urban Area" who showed that, there was a highly statistical significant relation between the years of experience and

the knowledge of the nurses pre- test. Also, this finding was in the same direction with **Issa et al., (2018)** who reported that, there is a significant correlation between nurses knowledge and the years of their experience. Regarding relationship between total level of nurses' practice and their characteristics as showed in table(4), the present study showed that, there was a highly statistically significant relation between total practices of nurses and their qualification and years of experience before designed guidelines implementation. This could be due to nurses with increasing in years of experience had better practice about feeding LBW infants than the less experienced nurses. Also day to day activities enhances nurses' experiences and improve their practices. Additionally, education is a potential means for implementing prevention strategies as it alters perception, increases knowledge and in turn changes work practice. This finding was in agreed with **Ebrah et al., (2020)** in a study about "The effect of intervention on nurses performance regarding feeding of premature baby in neonate care unit at public hospitals in Hodeida city: Yemen " who revealed that, there was a highly statistically significant relation between total practices of nurses and their qualification and years of experience pre-intervention.

As regarding to studying the correlation between studied nurses' total knowledge and total practices showed in table (5) regarding feeding LBW infants, there was a positive correlation and highly statistical significance between total knowledge and total practice scores at pre and post designed guidelines intervention phases This might be due to knowledge is the baseline for the practices. This result was matched with **Ebrah et al., (2020)** who revealed that, there was a strong positive correlation between nurses' total knowledge and their total practice. Also, this

finding was in agreement with **Mohammed & Abdel Fattah, (2018)** who stated that, there was highly statically among knowledge and practices for the studied sample at pre-implementation and post implementation for the educational program.

Conclusion

The designed guidelines was effective in improving nurses' knowledge and their practices level related to feeding low birth weight infants, improved physiological status of low birth weight infants, Besides, there was a positive correlation between nurses total knowledge and their practices level regarding feeding low birth weight infants before and after the designed guidelines implementation.

Recommendations

1- Provision of educational programs in order to update nurses' knowledge and enhance their practices regarding feeding low birth weight infants.

2- Designing and distributing Arabic booklets regarding feeding of LBW infants to all nurses who are working at NICU.

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تأثير الارشادات الغذائية المصممة علي أداء الممرضين تجاه تغذية حديثي الولادة ناقصي الوزن

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يعتبر حديثي الولادة ناقصي الوزن من أخطر التحديات التي تواجه صحة الأم والطفل في جميع البلدان المتقدمة والنامية ويعتبر نقص الوزن للطفل عند الولادة من أهم أسباب وفيات الأطفال حديثي الولادة. لذلك هدفت الدراسة إلى تقييم تأثير الإرشادات الغذائية المصممة على أداء الممرضين تجاه تغذية حديثي الولادة ناقصي الوزن. وقد تم استخدام التصميم شبه التجريبي لإجراء الدراسة. وأجريت هذه الدراسة في وحدات العناية المركزة لحديثي الولادة بمستشفى بنها الجامعي ومستشفى الأطفال التخصصي بنها. وقد أجريت الدراسة على جميع الممرضين المتاحين بوحدات الرعاية المركزة لحديثي الولادة في مستشفى بنها الجامعي ومستشفى الأطفال التخصصي بنها (80 ممرض/ممرضه). وعينة غرضية من حديثي الولادة ناقصي الوزن (80 طفل/ه). تم جمع البيانات باستخدام الأدوات التالية: وهي عبارة عن (1): استمارة استبيان خاصة بالبيانات الشخصية للممرضين وتقييم معلومات الممرضين تجاه حديثي الولادة ناقصي الوزن وتجاه تغذية حديثي الولادة ناقصي الوزن عند الولادة (2) استمارة ملاحظة: لتقييم ممارسات الممرضين وتجاه تغذية حديثي الولادة ناقصي الوزن. (3): البيانات الشخصية والطبية لحديثي الولادة ناقصي الوزن. حيث كشفت النتائج أن متوسط عمر الممرضين هو 32.02 ± 4.42 سنة. وأكثر من نصفهم (52.5%) يعملون في مستشفى بنها الجامعي. وأن هناك فروق ذات دلالات إحصائية بين مستوي معلومات وممارسات الممرضين ومؤهلاتهم وسنوات الخبرة قبل وبعد تنفيذ الإرشادات الغذائية المصممة. وهناك علاقة إيجابية ذات دلالة إحصائية بين مستوي معلومات وممارسات الممرضين تجاه تغذية حديثي الولادة ناقصي الوزن. وقد أوصت الدراسة بتنفيذ برامج توجيهية بصفة مستمرة للممرضين العاملين بوحدات الرعاية المركزة لحديثي الولادة لتحديث مستوي معلوماتهم و ممارساتهم تجاه تغذية حديثي الولادة ناقصي الوزن.