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Nurses' Performance Regarding Parenteral Nutrition at Neonatal Intensive Care Units

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Abstract: **Background: The nurses have a very responsible role in care of the neonates' receiving parenteral nutrition. Therefore, Neonatal nurses form the backbone of neonatal care units. Aim of the study was to assess nurses' Performance regarding parenteral nutrition at neonatal intensive care units .Settings: The study was conducted at neonatal intensive care units at Benha University Hospital. Design: An exploratory descriptive research design was used to achieve the aim of this study. Methods: A Purposive sample was include all nurses that give care for neonates under parenteral nutrition. Tools: Data were collected through two tools; A structured questionnaire sheet and an observational checklist. Results: more than one third of the studied nurses their age ranged between 25<30 years, two fifth of them graduated from technical institute of nursing. More than two thirds of the studied nurses were deploma nurse. The present study revealed that, two fifth of the studied nurses their years of experience ≥8 years. According to training courses of the studied nurses the finding of the current study revealed that, more than one quarter of the studied nurses attend training courses for parenteral nutrition. There was no significant relation between total knowledge of studied nurses and gender. There were highly significant relation between total practice of studied nurses and their educational level, years of experience and attend training courses. Conclusion: less than half of the studied nurses had average level of total knowledge about parenteral nutrition. Also, more than half of the studied nurses were incompetent regarding total practice about parenteral nutrition. Recommendations: Developing periodical training programs regarding parenteral nutrition of neonate based on evidence-based guideline protocol for the nurses at neonatal intensive care units.**

Keywords: **Parenteral nutrition, Nurses` performance, Neonatal Intensive care units.**

1. INTRODUCTION

The neonatal period is a transition phase, critical to the adaptation to extra uterine life. The neonatal period is the most crucial phase of life and survival during this period is of paramount importance. The neonatal period (from birth to 1 month) is a time of extensive and ongoing system transition from uterine environment to external world, this includes the initial period after birth which is referred to as the perinatal period ***(Fairchild, Nagraj, Sullivan, Moorman & Lake, 2019).***

Parenteral nutrition, or intravenous feeding, is a method of getting nutrition into the body through veins. Depending on which vein is used, this procedure is often referred to as either total parenteral nutrition (TPN) or peripheral parenteral nutrition (PPN). PN delivers nutrients such as sugar, carbohydrates, proteins, lipids, electrolytes, and trace elements to the body. These nutrients are vital in maintaining high energy, hydration, and strength levels. Some times PN only need to get certain types of nutrients intravenously ***(Pierro & Eaton, 2020).***

Indications for starting neonatal PN; for preterm born before 31 weeks and preterm neonates born at or after 31 weeks, start PN if sufficient progress is not made with enteral feeding in the first 72 hours after birth and starting PN for preterm and full term who are unlikely to establish sufficient enteral feeding, for example, neonates with; a congenital gut disorder or a critical illness such as sepsis ***(Colaizy, Demauro, Mcnelis & Poindexter, 2018).***

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One of the effective members of the healthcare team (health staff) is the nurse who, by having the essential insight and necessary clinical skills, can directly provide and perform the special infant care, which is an especially important issue. Having the knowledge of the effects of prematurity on the digestive system's function. Nutritional needs of the premature and high-risk infants, as well as the nutritional supportive approaches, the neonatal nurses can have a better assessment of the infant's nutritional status and also manage it more appropriately **(Deshpande & Cai, 2020).**

AIM of the study:

This study aimed to assess nurses' Performance regarding parenteral nutrition at neonatal intensive care unit .

Research Questions:

- What are the level of knowledge and practices of nurses related to parenteral nutrition of neonate at neonatal intensive care units?
- Is there a relation between nurses' performance and their socio- demographic characteristics?

2. SUBJECTS AND METHODS

A research design was conducted to achieve the aim of this study.

Research Settings:

The study was conducted at neonatal intensive care units affiliated to Benha University Hospital which divided to four units (unite for critical cases, unit for mild cases, unite for stable cases and unit for surgical cases).

Subjects:

A Purposive sample composed of 56 nurses working at neonatal intensive care units in Benha University Hospital who provide care to neonates were recruited for the study.

Under the following criteria:

1. The nurses working at neonatal intensive care units and had more than two years of experience.
2. The nurses that give direct care for neonates under total parenteral nutrition.
3. Regardless their age, sex and educational level.

Tools of the study:

First tool: A structured questionnaire sheet it was designed by the researcher after reviewing related literatures, it consists of two parts:

Part (1): Characteristics of nurses such as age, gender, educational level, attendance of training programs related to parenteral nutrition and years of experience.

Part (2) : Concerned with knowledge of neonatal nurses' related to parenteral nutrition, as definition, indication of parenteral nutrition, types of infusion devices, complication of cannula, advantages of using parenteral nutrition, infection control and nursing management.

Scoring System:

A scoring system was followed to assess nurses' knowledge. The questionnaire was contain of 29 questions, the total score for the questionnaire was be 29 grades, the correct answer was be scored as a one grade which devided to (0.25, 0.5, 0.75 or 1) acorrding to complete or incompelete answer in each open question and the incorrect answer was scored as zero grade. Then scores summed and converted into a percentage score.

It classified into 3 categories:

- Good knowledge if score ≥ 80% .
- Average knowledge if score from 60 < 80%.
- Poor knowledge if score < 60%.

Total knowledge	Actual Score / 29	%
Good	> 23.2	≥ 80%
Average	17.4 < 23.2	60% < 80%
Poor	< 17.4	< 60%

Tool II: Graduated Scale for Peripheral intravenous cannulation and a multicenter observational study, It was adopted from (***Legemaat, et al., 2016***) by the researcher to observe the nurses' practices related to parenteral nutrition of neonates at intensive care unit such as; insertion of cannula and procedure of intravenous infusion.

Scoring system:

A scoring system followed to assess nurses' practice; each checklist was assigned a score according to sub-items. The items were evaluated as "done correctly" taken two score, "done incorrectly" was taken one score and "Not done" was taken zero score. These scores was summed up and converted into a percentage score.

It was classified into 2 categories:

- Competent if score ≥ 80%.
- Incompetent if score < 80%

The validity & reliability of the tool:

The revision of tool for clarity, comprehensive, relevance, understanding and applicability and validity were submitted by a panel of three experts specialized in the field pediatric nursing.

Tools reliability was tested using Cronbach alpha coefficient. Test of reliability for knowledge questionnaire was (0.702) and Graduated Scale was (0.796).

3. OPERATIONAL DESIGN

Preparatory Phase

This phase included reviewing of literature related to neonatal nursing care and PN. This served to develop the study tools for data collection. During this phase, the researcher also visited the selected places to get acquainted with the personnel and the study settings. Development of the tools was under supervisors' guidance and experts' opinions were considered.

Pilot Study

It was carried out including of sample size 6 nurses those percent 10% to test the applicability study tools and to estimate the time needed to fill the questionnaire according to the result of the pilot study, some corrections modification and omisions of items were performed so the pilot study nurses were not included in the main study sample

Field of work

An approval was obtained from Faculty of Nursing/ Helwan University. Then, approval to carry out this study was obtained from medical and nursing director of Banha University Hospital. Explaining the aim of the study in order to obtain thier permission and cooperation. The data of this study was collected in four months, from the begining of Sptember 2019 to the end of Decemder 2019. The researcher firstly met with the neonatal nurses working at the neonatal intensive care units, explained the purpose of the study after introducing herself and assure the nurses about the anonymity of their answers and that the information will be used for scientific research only. The researcher was visiting the study setting 2 days \ week (Sunday and Wednesday) at morning shift (8 a.m- 2 p.m) and afternoon shift (2 p.m - 8 p.m) to collect data. The questionaire sheet was filled by neonatal nurses in 15- 30minutes, while the checklist for assessing nurses' practice regarding neonatal parenteral nutrition was filled dy researcher in 30-45 minutes.

Ethical Considerations:

Ethical approval was obtained from the Ethical Research Scientific Committee of Faculty of Nursing/ Helwan University. Then, approval to carry out this study was obtained from medical and nursing director of Banha University Hospital. Also, oral nurses' consent was obtained to participate in this study. Anonymity and confidentiality of the study subject

secured. nurses were informed that all the gathered data used for research purpose only, the study was harmless and the study subjects were allow to withdraw from the study at any time freely.

Administrative design:

An official permission was obtained from Dean of Faculty of Nursing Helwan University to manager of Banha University Hospital. The researsher met the hospital director and explained the purpose of the study and methods of data collection.

Statistical Design:

Data collected from the studied sample was revised, enetred using personal compuer (PC). Computerized data entery and statistical analysis for Social Sciences (SPSS) version 22. Data were persented using descriptive statistics in the form of frequencies, percentages. Chi-square test (X2) was used for comparisons between qualitative variables. Spearman correlation measures the strength and direction of association between two ranked variables.

Significance of the results:

- Highly significance at p-value <0.01.
- Statistically significance at p-value < 0.05.
- Non significance at p-value ≥0.05

4. RESULTS

(Table 1): showed that, nearly two fifth (39.3%) of the studied nurses their age ranged between 25<30 years, with mean of age was 31.51 ± 1.19 year. As regard to marital status and gender, more than half & three quarter (55.4% and 75%) of the studied nurses were married and female, respectively. In relation to the educational level of the nurses under study, it was found that, Less than half of them (41.1%) had graduated from technical institute of nursing . Concerning job, more than two third of the under study (67.9%) were diploma nurse. Also, more than one third (39.3%) of the studied nurses their years of experience ≥ 8 years.

(Figure 1): shows that, near half (46.4%) of the studied nurses had average level of total knowledge about parenteral nutrition. Also, one fifth (21.4%) of them had good level of total knowledge about parenteral nutrition. While, nearly one third (32.2%) of them had poor level of total knowledge about parenteral nutrition.

(Figure 2): shows that, 58.9% of the studied nurses were incompetent regarding total practice about parenteral nutrition. While, 41.1% of them were competent regarding total practice about parenteral nutrition.

(Table 2): Showed that, there were highly statistically significant relation between total knowledge of the studied nurses about parenteral nutrition and their educational level, years of experience and attend training courses at (P < 0.01). Also, there were statistically significant relation with their age and job level at (P < 0.05). While, there were no significant relation with their marital status and gender at (P >0.05).

(Table 3): Showed that, there were highly statistically significant relation between total practice of the studied nurses about parenteral nutrition and their educational level, years of experience and attend training courses at (P < 0.01). Also, there were statistically significant relation with their age, marital status and job level at (P < 0.05). While, there were no significant relation with their gender at (P >0.05).

(Table 4): Showed that, there were highly significant positive correlation between total nurse`s knowledge about parenteral nutrition and their total practice.

Discussion:

Parenteral nutrition is indicated for initiation of nutritional support for premature and high-risk neonates, as it provides nutritional support and a life saving therapy when enteral intake is not possible or does not provide sufficient caloric requirements. ***(Abdel-Fattah, Shafik, & Mostafa, 2018).*** The initial goal of PN is to minimize losses and preserve existing body stores and progresses for provision of nutrition in order to promote growth and development. Since poor knowledge in PN can causes severe impairment to neonatal infants ***(Marofi, Bijani, Abdeyazdan, & Barekatain, 2017).***

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As regard to **marital status and gender**, the results of the current study indicated that, more than half and three quarters of the studied nurses were married and female, respectively. This could reflect that the profession of nursing in Egypt was mostly females. This results were accordance with **Khanali, Rassouli, Tajalli, Baghestani, & Jafari, (2019)** which conducted a study to assess the Nursing Care Regarding Prevention of Ventilator-Associated Pneumonia in Neonates at Mahdiyeh, Mofid, and Imam Hossein hospitals , who revealed that more than two third of nurses under the study were female and married.

In relation to the **Educational level** of the studied nurses, it was found that, two fifth of them had technical institute of nursing and less than one quarter had diploma degree. Also, more than two thirds of the studied sample were diploma nurse. These results might be due to preference of bachelor degree nurses to work at private hospitals, travel abroad, and when working in the governmental hospitals, bachelor degree nurses work as a head nurses not as bedside nurse. Approximately the same finding was indicated by **Issa, Madwah, & Al Mosawi, (2018)** which conducted a study to Evaluate Nurse's Knowledge in Management of Premature Baby in Neonatal Units and reported that one third of nurses under the study had technical nursing degree.

But the present study is inconsistent with **Mojen, Rassouli, Tajalli, Baghestani, & Jafari, (2019)** which entitled "Clinical Assessment of Nursing Care Regarding Prevention of Ventilator-associated Pneumonia in Neonates. This study revealed that more than half of the studied nurses had Bachelor nursing degree.

According to levels of total knowledge about PN, the finding of the current study revealed that, less than half of the studied nurses had average level of total knowledge about PN. Also, more than one fifth of them had good level. While, less than one third of them had poor level. This results may be due to no pre-employment orientation, depploma degree and increased work load which may hinder the ability to read and upgrade their knowledge regarding care of neonates with PN. Hence there is a need for continuing training in this area to have adequate knowledge among all the nurses in the NICU.

These results approved with the study performed by **Abdel-Fattah et al. (2018)** who found that more than three quarter of the studied nurses had average level of total knowledge scores. But the present study is inconsistent with **Ameri et al. (2016)** who reported that more than half of the nurses under study had poor level of total knowledge regarding to PN.

Concerning total practice regarding to parenteral nutrition, the finding of the current study revealed that more than half of the studied nurses were incompetent regarding total practice about PN. While, about two fifth of them were competent. These results may be due to unavailability of procedures book for the nurses at the unit, the training unit was based on theoretical training and also the lack of supplies and equipment that used for parenteral nutrition. These results supported with the study done by **Abdel-Fattah et al. (2018)** who found that less than two thirds of the studied nurses had incompetent in their total performance scores regarding PN at NICUs.

According to the relation between demographic characteristics of the studied nurses and their total knowledge about parenteral nutrition, the present study revealed that there were highly statistically significant relation between total knowledge of the studied nurses about PN and their educational level, years of experience and attend training courses. Also, there were statistically significant relation with their age and job title. This might be explained as, good level of knowledge were higher among nurses with high education and more years of experience and attending training courses. This results agreement with the study achieved by **Keogh, Ahmed, Abouazaid, & Elmusharaf (2015)** about Awareness of Health Workers of Total Parenteral Feeding in Neonatal Units and found that level of education, years of experience and training courses had a significant effect on nurses' awareness level about total Parenteral Feeding.

Also, the present study indicated that there was no significant relation between total knowledge of studied nurses and their marital status and gender. This could be due to that total knowledge level affected by education and years of experience. These results approved with the study performed by **Moula & Kambal (2016)** who conducted study to assess Pediatric Nurses' knowledge and Practices Regarding Nursing Management of Premature Neonates in Neonatal Intensive Care Unit and revealed there was no statistically relation between total knowledge of studied nurses and their marital status and gender.

Regarding to the relation between demographic characteristics of the studied nurses and their total practice regarding parenteral nutrition, the present study revealed that there were highly significant relation between total practice of studied nurses and their educational level, years of experience and attend training courses. Also, there were significant relation with their age, marital status and job title. This might be explained as, competent level of practice were higher among nurses with high education and more years of experience, attending training courses and older. This results agreement with the study achieved by **Aziz & Mansi (2017)** about

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Assessment Quality of Nursing Care Provided to Neonates with Respiratory Distress Syndrome at Intensive Care Unit, and found that there were highly significant relation between total practice of studied nurses and their educational level, years of experience and attend training courses.

Also, the present study indicated that there was no statistically relation between total practice of studied nurses and their gender. This could be explained as, there was no difference between nurses' gender related practice level. These results approved with the study performed by **Soliman et al. (2019)** who revealed there was no statistically relation between total practice of studied nurses and their gender.

Additionally**,** the present study indicated that there was highly significant positive correlation between total nurse`s knowledge about parenteral nutrition and their total practice. This could be explained as good level of knowledge among nurses was more encountered among those nurses with competent level of practice. These results approved with the study performed by **Abdel-Fattah et al. (2018)** who found that there was a positive correlation between total levels of knowledge of the studied sample and their level of practice. But this result disagreement with the study performed by **Morgaonkar et al. (2017)** who found that there was significant negative correlation between total nurse`s knowledge about parenteral .

Table (1) Percentage distribution of the studied nurses regarding to their demographic characteristics (n=56).

Items	No.	%
Age (year)		
< 20	4	7.1
20<25	12	21.4
25<30	22	39.3
>30	18	32.1
Mean SD 31.51 ± 1.19		
Gender		
Male	14	25
Female	42	75
Marital status		
Single	17	30.4
Married	31	55.4
Divorced	5	8.9
Widow	3	5.3
Educational level		
Diploma of Nursing	12	21.4
Technician Institute of Nursing	23	41.1
Bachelor of Nursing	15	26.8
Postgraduate	6	10.7
Job		
Staff Nurse	38	67.9
Supervisor	12	21.4
Other	6	10.7
Years of experience		
2< 4	8	14.3
4< 6	11	19.6
6 < 8	15	26.8
≥ 8	22	39.3
Mean SD 6.97 ± 5.80		

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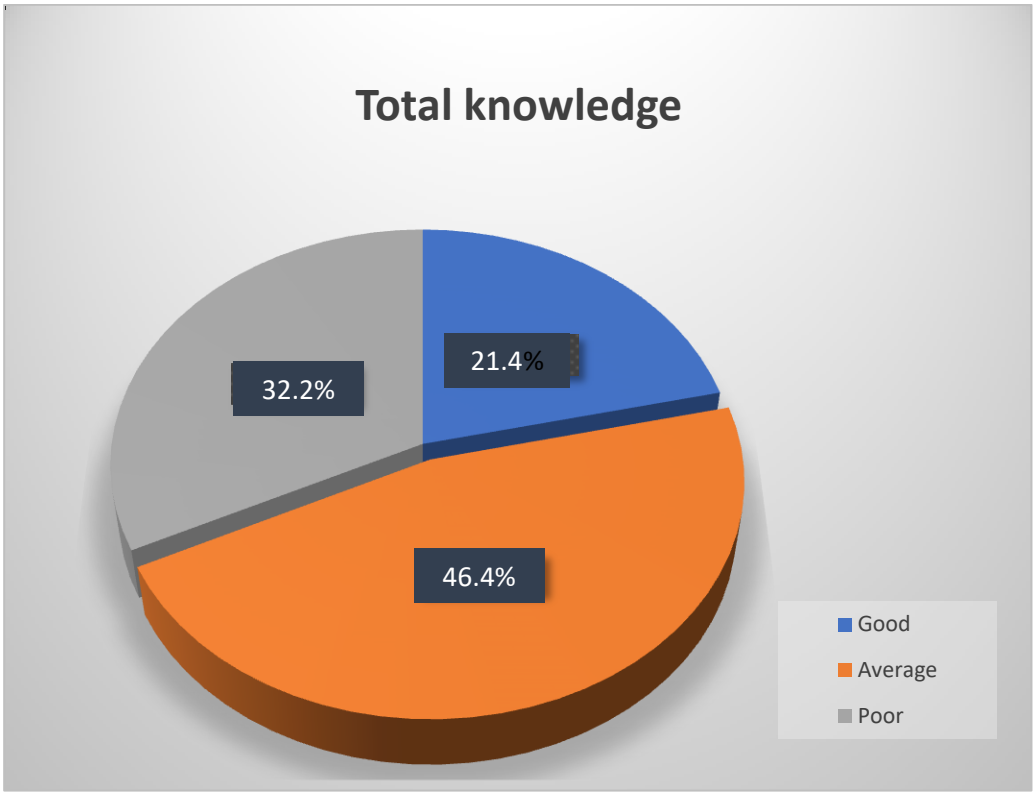

Figure (1) Percentage distribution of the studied nurses regarding their total knowledge about parenteral nutrition (n=56).

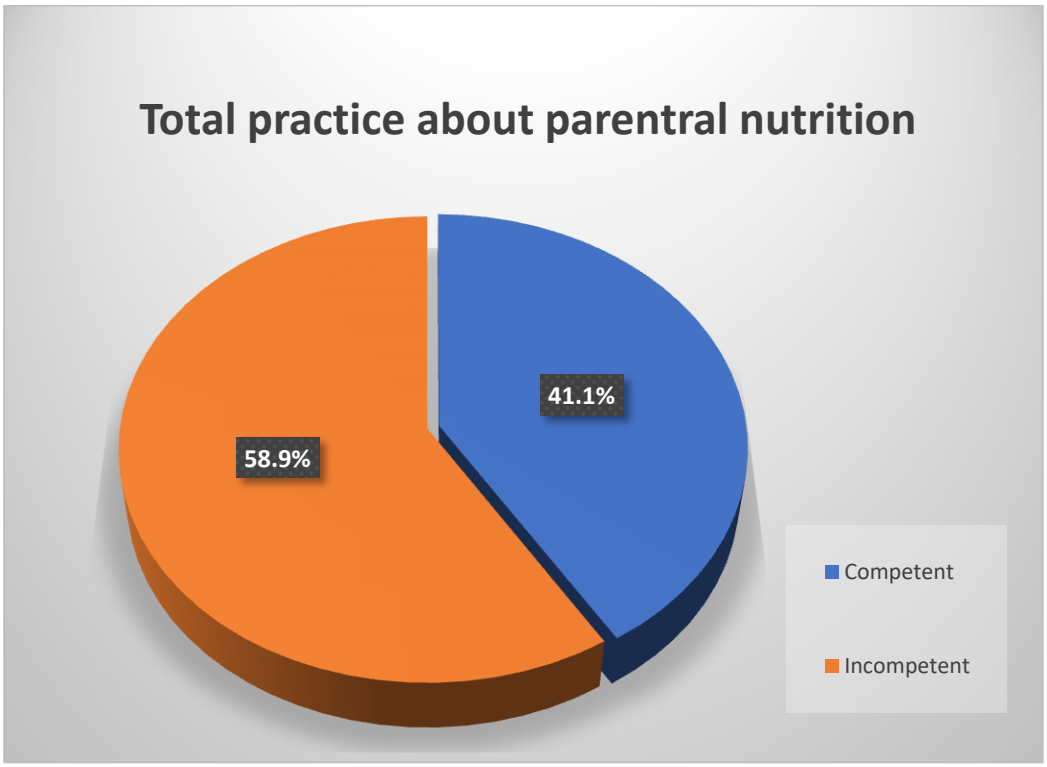

Figure (1) Percentage distribution of the studied nurses according their total practice regarding parenteral nutrition (n=56).

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(Table 2) Relation between demographic characteristics of the studied nurses and their total knowledge about parenteral nutrition (n=56).

Items		Total knowledge						X2	P-Value
		Good (n=12)		Average (n=26)		Poor (n=18)			
		No.	%	No.	%	No.	%		
Age (year)	< 20	0	0.0	0	0.0	4	22.3	13.15	0.02*
	20<25	3	25	3	11.5	6	33.3		
	25<30	4	33.3	12	46.2	6	33.3		
	>30	5	41.7	11	42.3	2	11.1		
Marital status	Single	3	25	7	26.9	7	38.8	7.270	0.125
	Married	8	66.7	14	53.8	9	50		
	Divorced	1	8.3	3	11.4	1	5.6		
	Widow	0	0.0	2	7.7	1	5.6		
Gender	Male	4	33.3	6	23.1	4	22.2	6.293	0.134
	Female	8	66.7	20	76.9	14	77.8		
Educational level	Diploma	0	0.0	1	3.9	11	61.1	31.01	.000**
	Technician Institute of Nursing	0	0.0	16	61.5	7	38.9		
	Bachelor	6	50	9	34.6	0	0.0		
	Postgraduate	6	50	0	0.0	0	0.0		
Job level	Diploma Nurse	3	25	20	76.9	15	83.3	17.14	0.01*
	Supervisor	6	50	4	15.4	2	11.1		
	Other	3	25	2	7.7	1	5.6		
Years of experience	2<4	0	0.0	0	0.0	8	44.4	33.89	.000**
	4<6	0	0.0	2	7.7	9	50		
	6<8	2	16.7	12	46.2	1	5.6		
	≥ 8	10	83.3	12	46.2	0	0.0		
Attend training courses	Yes	12	100	2	7.7	2	11.1	25.69	.001**
	No	0	0.0	24	92.3	16	88.9		

***Significant at p ‹ 0.05. **Highly significant at p ‹ 0.01.**

(Table 3)Relation between demographic characteristics of the studied nurses and their total practice about parenteral nutrition (n=56).

Items		Total practice				X2	P-Value
		Competent (n=23)		Incompetent (n=33)			
		No.	%	No.	%		
Age (year)	< 20	0	0.0	4	12.1	12.95	0.03*
	20<25	3	13.1	9	27.3		
	25<30	5	21.7	17	51.5		
	>30	15	65.2	3	9.1		
Marital status	Single	10	43.5	7	21.2	11.220	0.032*
	Married	12	52.2	19	57.6		

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	divorced	1	4.3	4	12.1		
	Widow	0	0.0	3	9.1		
Gender	Male	2	8.7	12	36.4	7.256	.122
	Female	21	91.3	21	63.6		
Educational level	Diploma	2	8.7	10	30.3	30.28	.000**
	Technician Institute of Nursing	3	13.1	20	60.6		
	Bachelor	12	52.2	3	9.1		
	Postgraduate	6	26	0	0.0		
Job	Staff Nurse	11	47.8	27	81.8	16.14	0.018*
	Supervisor	10	43.5	2	6.1		
	Other	2	8.7	4	12.1		
Years of experience	2<4	0	0.0	8	24.2	31.20	.000**
	4<6	1	4.3	10	30.3		
	6<8	3	13.1	12	36.4		
	≥ 8	19	82.6	3	9.1		
Attend training courses	Yes	16	69.6	0	0.0	24.39	.001**
	No	7	30.4	33	100		

***Significant at p ‹ 0.05. **Highly significant at p ‹ 0.01.**

Table (4) Correlation between the nurses` knowledge about parenteral nutrition and their total practice.

Items	Total practice
Total knowledge	r = 0.407 P = .000**

(*) Statistically significant at p<0.05--(**) Highly significant at p<0.01

5. CONCLUSION

Based on the findings of the current study, it is concluded that: less than half of the studied nurses had average level of total knowledge scores about parenteral nutrition. Also, more than half of them were incompetent regarding total practice about parenteral nutrition. Moreover, nurses' knowledge was influenced by their age, educational level, job title, years of experience and attendance of training courses. Likewise, nurses' practice was influenced by their age, educational level, job title, years of experience and attendance of training courses. Also, there was highly significant positive correlation between total nurse`s knowledge about parenteral nutrition and their total practice.

RECOMMENDATIONS

In the light of the findings of the current study the following recommendations can be suggested:

- Applying periodical training programs regarding parenteral nutrition of neonates depending on evidence-based guideline protocol for the nurses at neonatal intensive care units.
- Preparing guidelines and competency checklist for the neonatal nurses who providing care for neonates on parenteral nutrition.
- Designing monitory system to continuously evaluate nurses' performance related to parenteral nutrition at neonatal intensive care units.
- Replication of the study on large number sample and other settings.

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