Knowledge, Attitudes, and Practices Toward Retinopathy of Prematurity Among Neonatal Intensive Care Nurses: A Cross-sectional Study

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Abstract

It is important to study the awareness of retinopathy of prematurity (ROP) among neonatal care nurses in hospitals. Unfortunately, there is a lack of studies conducted among nurses on this subject in Palestine. Thus, this study purposed to assess the knowledge, attitudes, and practices toward ROP among neonatal intensive care nurses in Palestine. A cross-sectional was used to conduct this study. A convenience sampling method was utilized to recruit 289 neonate intensive care nurses working in private and governmental hospitals. The findings showed that around 48.0% of the nurses had low knowledge about preventing ROP. Most of the nurses (78%) reported a neutral attitude toward preventing ROP. Moreover, overall nurses' practices regarding ROP were fair (57.1%). There was a difference in practices regarding ROP according to the health sector ($P < .05$), in which the private sector had better practices compared to the governmental sector. Additionally, there was a significant difference in knowledge regarding ROP according to educational level ($P < .05$). Also, a significant difference was found in knowledge and practices regarding ROP according to nurses' experience. Attitudes and practices were the main significant predictors of knowledge ($B = 0.153$, $P < .05$; $B = 0.172$, $P < .05$, respectively). Knowledge and practices were the main predictors of attitudes ($B = 0.126$, $P < .05$; $B = 469$, $P < .001$), respectively. Knowledge, attitudes, and experience in neonate intensive care nurses were the main significant predictors of practices ($B = 0.135$, $P < .05$; $B = 0.449$, $P < .001$; $B = 0.224$, $P < .05$, respectively). It is necessary to develop an educational program and competency-based training programs for neonate intensive care nurses about ROP and implement preventive strategies.

Keywords

attitudes, neonate intensive care nurses, knowledge, practices, retinopathy of prematurity

What we already know about this topic?
Retinopathy of prematurity (ROP) is the cessation of normal eye development and subsequent abnormal vessel growth that occurs exclusively in premature infants. Nurses especially neonatal intensive care should improve their knowledge, attitudes, and practices toward ROP, which can be enhanced by improving competency-based training and progress pre-service and in-service nursing training curricula to incorporate special content on newborn and preterm nursing care, including ROP prevention.

This research's contribution to the field.
Unfortunately, there is a lack of studies conducted among nurses on this subject in Palestine or the Middle East, while few studies were performed globally. Thus, this study seeks to ascertain whether neonatal intensive care nurses know their valuable role in preventing ROP in premature neonates.

This research's implications for theory, practice, or policy
This study can inform policy-makers to enhance educational opportunities and competency-based training programs among NICU nurses about ROP and prevention strategies needed to increase the nurses' knowledge and improve their capabilities about the mechanisms and ways of dealing with ROP. Also, decision-makers should develop policies and protocols for the prevention of ROP.

Introduction

Premature or preterm is the birth before 37 weeks of gestational age.[1] Premature birth is the most common cause of neonatal mortality and one of the most important causes of death in children under 5 years of age.[2,3] Preterm neonates suffer from low immunologic competence, which increases their risk for many infectious processes that could lead to neurodevelopmental diseases and chronic lung disease.[4,5] Despite improvement in clinical conditions and survival levels, premature delivery has a significant risk of negative impact on certain organs, such as heart,[6,7] lungs,[8,9] brain,[10] and eye.[11]

Improving survival in small especially vulnerable premature babies has contributed to the reappearance of premature complications including retinopathy of prematurity (ROP), which is one of the main causes of blindness among children.[11,12] ROP is the cessation of normal eye development and subsequent abnormal vessel growth that occurs exclusively in premature neonates.[13] Worldwide, at least 50 000 children experience blindness as a result of ROP, and in the United States, approximately 600 premature infants become blind yearly.[14,15] However, the highest rates of ROP were in low- and middle-income countries.[16]

The main risk factors for ROP include, early gestational age (GA) $\leq$30 weeks, low birth weight (BW) $\leq$1500 g,[17] and other factors related to hypoxia, twin's pregnancy, respiratory distress syndrome, anemia, intraventricular hemorrhage, blood transfusions, fungal infections, and sepsis.[17,18]

The first examination/screening for premature infants should be performed between 4 and 9 weeks' chronological age (CA), depending on postmenstrual age at birth.[19] Multidisciplinary management is an important approach to address the needs of premature infants in low and middle-income countries as they improve neonatal intensive care. Sufficient training should be provided to healthcare professionals including nurses to enhance the quality of care for premature neonates.[20] The introduction and maintenance of effective programs for premature neonates necessitates a team approach with clear and sound leadership and a partnership between neonatologists, nurses, and ophthalmologists to properly apply the guidelines.[21]

Nurses especially those in neonatal intensive care units (NICU) should improve their knowledge, attitudes, and practices,[22] which can be enhanced by improving competency-based training and progress pre-service and in-service nursing training curricula to incorporate special content on newborn and preterm nursing care, including ROP prevention.[23]

The "knowledge, attitudes, and practice (KAP)" model is a common tool for gathering information from patients and practitioners.[24] KAP model was constructed based on the cognitive, behavioral theory of Schwartz to study the relationship between knowledge, attitudes, and practice.[25] The KAP model can be beneficial to understand nurses' practices and it is valuable for identifying problems to initiate efficient interventions. It can show the knowledge, attitudes, and practices of NICU nurses and determine the relationship between each factor and ROP. The KAP model can test this gap to understand how knowledge is associated with attitudes and practices toward ROP among nurses in the NICU.

In Palestine which is considered a low-income country, the incidence of ROP and severe type that needs treatment was 23.5% and 11.3%, respectively.[26] Nurses are the core of the health-related Palestinian workforce who provide primary, secondary, and tertiary healthcare services throughout the country. They are the main healthcare professionals in the NICU and are expected to work safely while providing care.[27,28] The NICU nurses should be alert to all risk factors associated with ROP. They should work in the core team and apply safe practices such as hand hygiene and asepsis to reduce infections, encourage breastfeeding, target oxygen saturation, and support nutrition to reach a good weight increase; these practices would help in decreasing ROP in this unit.[29] Additionally, nurses should play a vital role in preventing blindness in neonates through eye screening for ROP to help in selecting infants eligible for screening based on national criteria and clinical Judgment.[16] This would be both a cost-effective and beneficial way to recognize newborns that need care from ophthalmologists.

With the advancement of the health system and the provision of health services in Palestine, whether in governmental or private sectors, it is important to assess the awareness of ROP among NICU nurses. Unfortunately, there is a lack of studies conducted among nurses on this subject in Palestine,[26] while few studies were performed globally.[18,29-32] Thus, this study seeks to ascertain whether NICU nurses know their valuable role in preventing ROP in premature newborns. Also, this study information would enhance the existing evidence and could help develop proper interventions to decrease the number of children vulnerable to blindness, thereby decreasing disabled children. Therefore, this study

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aimed to assess the knowledge, attitudes, and practice toward ROP among NICU nurses in Palestine. Also, the following questions were guided by the current study:

- What are the levels of knowledge, attitudes, and practices toward ROP among NICU nurses in Palestine hospitals?
- Are there differences between knowledge, attitudes, and practice scores of ROP and demographic characteristics among NICU nurses in Palestine hospitals?
- What are the predictors of NICU nurses' knowledge, attitudes, and practices regarding ROP prevention?

Furthermore, the following hypotheses were derived to guide this study:

- There is a relationship between demographic characteristics (eg, gender, age, marital status, educational level, place of residence, kind of hospital, training regarding ROP, and number of years of experience in the NICU) and knowledge, attitudes, and practice of ROP among NICU nurses.
- There is a difference in knowledge, attitudes, and practice of ROP among NICU nurses according to demographic characteristics.
- There is a relationship between knowledge, attitudes, and practice of ROP among NICU nurses.

Methods

A cross-sectional design was used to conduct this study. The study was performed at 16 private hospitals and 8 government hospitals in the West Bank and East Jerusalem, Palestine from September 2019 to July 2020. The target population in the present study included all NICU registered nurses in governmental and private hospitals in the West Bank, Palestine. All working registered nurses in NICUs in the selected hospitals were invited to participate.

The inclusion criteria included registered nurses who had experience of 6 months or more in the NICU and provided bedside care. On the contrary, the exclusion criteria included the associate nurses, nurses working in other departments, and those who were not available at NICUs during the period of study.

The sample size was calculated using G*power with alpha = .05, effect size = 0.09, and power = 0.95, with 9 predictors. A total sample of 271 participants was needed to conduct this study. An additional 20% were added to overcome incomplete questionnaires and withdrawn.

Study Instruments

A self-administered instrument was developed by the researchers based on the literature and composed of the following: socio-demographic characteristics (eg, gender, age, marital status, educational level, place of residence, kind of hospital, training regarding ROP, and number of years of experience in the NICU) and ROP scale, which consisted of knowledge, attitudes, and practices subscales.

The ROP was developed after an extensive search and critical review for instruments assessing the study outcomes, all results revealed the availability of instruments among pediatricians.[33] Then, this article and the pediatric nursing textbooks[34,35] were reviewed to develop a new instrument able to evaluate study outcomes among nurses. An instrument consisting of 35 items was developed in English, after that, it was translated from English into Arabic by an English translator and then back-translated into English to make sure of their accuracy (Supplemental 1).

Because Arabic is the native language in Palestine; the questionnaire was translated into Arabic following the World Health Organization (WHO) translation procedure to overcome any language barriers and to maintain content validity. Also, the Arabic translated version was checked by an Arabic translator who has got Ph.D. in Arabic language. The content validity index (CVI) for the Arabic version of the tools was evaluated by 5 experts in the field of the study. Those experts were provided with a brief description of the study purposes and the tools, in addition to the CVI form for scoring the items in these tools. After returning the experts' responses, the CVI for the tools was calculated and was 1 for each tool.

The final ROP scale consists of 35 items divided into 3 subscales including knowledge, attitudes, and practice regarding ROP. Nurses' knowledge regarding the ROP questionnaire is composed of 15 multiple-choice questions that had been developed and modified after critical reviewing of the literature. Participants were informed to choose the correct answer from the choices. Knowledge questions included characteristics of the disease, time of screening, gestational age for screening, risk factors, complications, range of the SPO_2, stages of the disease, use of safe oxygen, common presenting signs, symptoms, and treatment available. Score "1" was put for the correct answer and "0" for a false answer. The total score was 15, which was changed into a percentage. Nurses' overall knowledge was categorized into 3 groups using Bloom's cut-off point, in which less than 60% reflected low level of knowledge, 60% to 80% indicated moderate level, and 80% to 100% reflected a high level.[36]

Nurses' attitudes concerning ROP are composed of 12 items. The participants were informed to rate the 5 levels of attitudes ranging from 1 to 5; where (1) strongly disagree; (2) disagree; (3) neutral; (4) agree; and (5) strongly agree. The level of attitudes was categorized using Bloom's cut-off point, whereas less than 60% reflected negative attitudes, 60% to 80% indicated neutral attitudes and 80% to 100% reflected positive attitudes.

Nurses' practice regarding ROP is composed of 8 items. The participants were informed to rate the 5 levels of practice ranging from 1 to 5; where (1) strongly disagree; (2) disagree; (3) neutral; (4) agree; and (5) strongly agree. The

Table 1. Socio-Demographic Variables Among Nurses (N = 289).

Variable	Category	n (%)
Age	Age (years) (*M* = 30.1, SD = 7.3, Range = 21-55)	
	Below 30 years	165 (57.1)
	30-39 years	93 (32.2)
	40-49 years	24 (8.3)
	50 years and above	7 (2.4)
Gender	Male	86 (29.8)
	Female	203 (70.2)
Marital status	Single	99 (34.3)
	Married	183 (63.3)
	Divorced	7 (2.4)
Educational level	Diploma	78 (27.0)
	Bachelor	160 (55.4)
	High diploma	32 (11.1)
	Master and above	19 (6.6)
Total experience in neonatal intensive care	6 months-5 years	160 (55.4)
	6-10 years	67 (23.2)
	11-15 years	31 (10.7)
	16-20 years	16 (5.5)
	More than 20 years	15 (5.2)
Hospital sector	Private	211 (73.0)
	Government	78 (27.0)
Training course about prevention of retinopathy of prematurity	Yes	29 (10.0)
	No	260 (90.0)

n = number; % = percentage.

level of practice was categorized using Bloom's cut-off point, in which less than 60% reflected poor practice, 60% to 80% indicated fair practice, and 80% to 100% reflected good practice.[25]

The pilot study was conducted on 40 participants who were excluded from the actual study. The participants reported that all questions were clear and the time to complete the questionnaire ranged between 10 and 20 min. Also, the reliability was assessed using internal consistency reliability, in which Cronbach's alpha for the total ROP scale on the study sample was .809 and the Cronbach's alpha for knowledge, attitudes, and practices subscales was .80, .88, and .78, respectively.

Ethical Considerations

Ethical approval was obtained from the (Ministry of Health at Palestine) before beginning data collection. Also, written informed consent was obtained from each participant; each questionnaire was attached with a paper explaining the purposes, instructions, and voluntary participation in this study. Participation by the nurses was voluntary and their involvement was confidential. Additionally, the nurses were informed that they might withdraw without any risks.

Data Collection Procedure

Meetings were arranged with the deputy nurses and the head nurses of NICUs in the selected hospitals. An explanation of the purposes of the study was provided to them. The head nurses were asked to prepare a list of registered nurses in NICUs who met the criteria. Then, the questionnaires that were attached to envelopes were given to the head nurses who took the responsibility of distributing and collecting them. After 1 week, the researcher collected the closed envelopes from units in the participating hospitals.

Data Analysis

Statistical Package for Social Sciences (SPSS) program version 23.0 was used to enter and analyze the data. The study variables were explained using descriptive analysis (eg, percentage, frequency, mean, and standard deviation). An independent *t*-test and ANOVA test were used. A multiple linear regression test was used to identify the potential predictors for practice. The results were significant at alpha ≤ .05.

Results

Two hundred eighty-nine out of 325 questionnaires were returned by the nurses with a response rate of 88.9%.

Table 2. Levels of Knowledge, Attitude, and Practice Regarding Prevention Retinopathy of Prematurity.

Variable	Category	n (%)
Knowledge	Low	139 (48.1)
	Moderate	132 (45.7)
	High	18 (6.2)
Attitudes	Negative	5 (1.7)
	Neutral	208 (72.0)
	Positive	76 (26.3)
Practice	Poor	7 (2.4)
	Fair	165 (57.1)
	Good	117 (40.5)

n = number; % = percentage.

The demographic characteristics of the nurses revealed that the mean age of the nurses was 30.1 (SD = 7.3) years. Most of the nurses were below 30 years (57.1%). The majority of them were females (70.2%) and around 63.0% were married. More than half of the participants (55.4%) had bachelor's degree. Additionally, the majority of the nurses (55.4%) had less than 5 years of experience in the NICU (Table 1).

The findings indicated that 48.1% of the nurses had low knowledge about preventing ROP, while only 6.2% had high knowledge. Also, most of the nurses (78%) reported neutral attitudes toward preventing ROP, however, 1.7% had positive attitudes. Moreover, overall nurses' practices regarding preventing ROP were fair (57.1%), while 2.4% of the nurses reported poor practice (Table 2). Also, concerning oxygen therapy, 41.9% of the nurses answered correctly on the question "range of the SPO2 for premature babies" and 57.1% answered correctly on the question "to use oxygen safely and reduce the risk of ROP, safe oxygen therapy requires": The responses for knowledge subscale are illustrated in Supplemental 2.

Our study findings showed that there was a difference in practices regarding the ROP health sector ($P < .05$), whereas the private sector had better practices compared to the government sector (Table 3). Additionally, there was a significant difference in knowledge regarding ROP according to educational level ($P < .05$). Also, a significant difference was found in knowledge and practices regarding ROP according to nurses' experience ($P < .05$).

As shown in Table 4, the variables that involved the model as predictors of knowledge were demographic data in addition to attitudes and practices. The full model that included all mentioned predictors of knowledge was statistically significant ($F_{(10, 278)} = 4.501$, $P < .001$; $R = .356$; $R^2 = .127$; adjusted $R^2 = .099$). This indicated that 12.7% of the variance in knowledge was illustrated by the whole model. The results found that attitudes and practices were the main significant predictors of knowledge ($B = 0.153$, $P < .05$; $B = 0.172$, $P < .05$, respectively). Further, practices were the strongest predictor (part = 0.144; part^2 = 0.0207).

Concerning the attitudes, the variables that entered the model as predictors were demographic data in addition to knowledge and practices. The full model that included all mentioned predictors of attitudes was statistically significant ($F_{(10, 278)} = 12.186$, $P < .001$; $R = .531$; $R^2 = .282$; Adjusted $R^2 = .259$). This indicated that 28.2% of the variance in attitudes was explained by the whole model. The results showed that knowledge and practices were the main significant predictors of attitudes ($B = 0.126$, $P < .05$; $B = 469$, $P < .001$), respectively. Further, practices were the strongest predictor (part = 0.438; part^2 = 0.1918).

Furthermore, the variables that involved the model as predictors of practices were demographic data in addition to knowledge and attitudes. The full model that included all mentioned predictors of practices was statistically significant ($F_{(10, 278)} = 14.128$, $P < .001$; $R = .560$; $R^2 = .313$; Adjusted $R^2 = .291$). This indicated that 31.3% of the variance in practices was explained by the whole model. The results found that knowledge, attitudes, and experience in NICU were the main significant predictors of practices ($B = 0.135$, $P < .05$; $B = 0.449$, $P < .001$; $B = 0.224$, $P < .05$, respectively). Further, attitudes were the strongest predictor (part = 0.428; part^2 = .1831).

Discussion

This study assessed the knowledge, attitudes, and practices of prevention of ROP among NICU nurses in Palestine. Our study showed that more than two-thirds of NICU nurses had low knowledge regarding preventing ROP. Also, the nurses had inadequate knowledge about oxygen therapy which is considered one of the risk factors for ROP. This result is supported by previous evidence which reported that Chinese nurses had low knowledge about preterm infants' care.[30] Additionally, Abdul-Sadik et al[37] found that nurses in Ghana had low knowledge about infant ocular health in neonatal units. On the contrary, the Indian nurses had higher knowledge regarding ROP[38] and had higher knowledge regarding neonate immediate care compared with the study sample.[31,32] Additionally, a study in Sudan indicated that 83.5% of the nurses were aware that oxygen has complications but the bulk didn't know the nature of the complications and what triggers these complications.[39] Metreş et al[40] indicated that the nurses provided care based on their observations rather than evidence-based knowledge in pain management during examining ROP. This study's result could be interpreted as most of the nurses did not attend training programs for neonate care, in addition to, no significant differences in their main study outcomes according to nursing training. Thus, the importance of conducting a training program focusing on integrating risk factors, especially the oxygen treatment approach should be implemented.

Our study revealed that almost one-fourth of NICU nurses had positive attitudes toward preventing ROP. This result is supported by Deng et al[30] study indicated that neonatal

Table 3. Differences Between the Knowledge, Attitudes, and Practices Regarding Prevention of Retinopathy of Prematurity According to Socio-Demographic Variables.

	Knowledge		Attitude		Practices	
Variable	M (SD)	t-test P-value	M (SD)	t-test P-value	M (SD)	t-test P-value
Gender						
Male	52.6 (20.7)	−1.565	74.1 (8.6)	−1.553	77.9 (9.9)	−1.567
Female	56.6 (19.5)	.119	75.8 (8.6)	.122	80.1 (11.0)	.104
Nurses' training						
Yes	52.0 (18.0)	−.974	74.7 (8.5)	−.386	76.4 (11.2)	−1.616
No	55.7 (20.1)	.331	75.4 (8.6)	.700	79.8 (10.6)	.107
Hospital sector						
Private	58.3 (19.1)	1.525	76.6 (89.4)	1.515	81.7 (11.4)	2.212
Government	54.3 (20.1)	.128	74.8 (8.3)	.131	78.6 (10.4)	.028
	M (SD)	F P-value	M (SD)	F P-value	M (SD)	F P-value
Educational level		4.310		1.399		1.989
Diploma	19.0 (2.1)	.005	8.7 (1.0)	.243	11.9 (1.3)	.116
Bachelor	19.7 (1.6)		8.9 (0.7)		10.4 (0.8)	
High diploma	20.7 (3.7)		7.8 (1.4)		9.3 (1.7)	
Master and above	18.8 (4.3)		7.1 (1.6)		9.3 (2.1)	
Experience		4.861		2.206		2.931
5 years and less	20.1 (1.6)	.001	8.7 (0.7)	.069	10.6 (0.8)	.021
6-10 years	17.7 (2.2)		9.0 (1.1)		11.2 (1.4)	
11-15 years	18.0 (3.2)		7.0 (1.3)		9.1 (1.6)	
16-20 years	20.9 (5.2)		8.6 (2.1)		9.4 (2.4)	
More than 20 years	19. 2 (4.9)		7.4 (1.9)		11.3 (2.9)	

M = mean; SD = standard deviation; t = t-test.

nurses' attitudes toward neonatal care were relatively low. On the contrary, Abdul-Sadik et al[37] found that the attitudes of midwives toward infants' ocular health were generally positive (89.8%). Also, the majority of Nigerian healthcare professionals including nurses had high attitudes toward caring for sick neonates and those in incubators.[41] This study's result might be interpreted as the majority of participants having short experience in NICU and a lack of training in ROP.

The current study showed that more than one-third of the NICU nurses had good practices, which is consistent with Hemati et al's[42] findings that demonstrated that Iranian NICU nurses had good practices in oxygen therapy. Previous studies interpreted that a low level of good practices could be due to unsatisfactory nursing knowledge, no continuous monitoring by skillful professionals, inadequate staffing, deficient work motivation, and failure to join training courses or specialized courses in oxygen therapy of neonatal intensive care.[43] Also, this might be due to a lack of training and guidelines and an increased workload.[42]

Our findings revealed that attitudes and practices were the main predictors of knowledge. Also, knowledge and practices were significant predictors of attitudes. Additionally, knowledge and attitudes were the main predictors of practices. However, the practices were the strongest predictor of

knowledge and attitudes. These results reflect the importance of these concepts and the significant association between them. These results are consistent with the KAP model,[24] which suggests that practices are influenced by knowledge and attitudes. These findings shed light on the importance of changing attitudes and improving knowledge to enhance practices toward ROP among NICU nurses.

Also, the experience in the NICU was the predictor of good practices toward ROP. Experienced nurses in the NICU can train young nurses to improve their practices to improve the quality of care.[37] Those nurses are oriented to hospital policies and guidelines related to neonate care in their ward.

Although this study is one of the first studies that discussed ROP in Palestine, it has the following limitations; the design was cross-sectional, which could not predict the cause-and-effect relationship. Also, the data were collected by self-reported questionnaire which could lead to bias. A convenience sample method was used to recruit participants which limited the generalization of the study.

Conclusion

The study showed that the majority of NICU nurses had low knowledge of ROP. Also, one-fourth of them had positive attitudes regarding ROP. Fortunately, more than half of the

Table 4. Predictors of Knowledge, Attitudes, and Practices toward Prevention of Retinopathy of Prematurity: Multivariable Linear Regression.

Predictor	b	B	t	P-value	95.0% CI Lower	Upper	Correlations Part	Part²
Knowledge								
Gender	1.831	0.042	0.702	.483	−3.300	6.961	0.039	0.0015
Age	0.221	0.081	0.759	.448	−0.353	0.796	0.042	0.0018
Marital status	−0.324	−0.008	−0.136	.892	−5.005	4.357	−0.008	0.0001
Educational level	0.647	0.026	0.444	.657	−2.223	3.517	0.025	0.0006
Place of residence	−1.229	−0.040	−0.699	.485	−4.691	2.233	−0.039	0.0015
Experience in NICU	1.271	0.074	0.706	.481	−2.273	4.816	0.040	0.0016
Hospital sector	−0.939	−0.021	−0.351	.726	−6.212	4.334	−0.020	0.0004
Attitudes	0.353	0.153	2.339	.020	0.056	0.650	0.131	0.0171
Practices	0.319	0.172	2.581	.010	0.076	0.563	0.144	0.0207
R = .356; *R²* = .127; Adjusted *R²* = .099								
Attitudes								
Gender	0.470	0.025	0.459	.647	−1.547	2.487	0.023	0.0005
Age	0.214	0.182	1.876	.062	−0.011	0.439	0.095	0.0090
Marital status	0.343	0.021	0.368	.714	−1.496	2.182	0.019	0.0003
Educational level	−0.054	−0.005	−0.094	.925	−1.182	1.074	−0.005	0.0000
Place of residence	−0.035	−0.003	−0.051	.960	−1.397	1.327	−0.003	0.0000
Experience in NICU	−1.093	−0.146	−1.550	.122	−2.481	0.295	−0.079	0.0062
Hospital sector	0.139	0.007	0.132	.895	−1.934	2.211	0.007	0.0000
Knowledge	0.055	0.126	2.339	.020	0.009	0.100	0.119	0.0141
Practices	0.378	0.469	8.636	.000	0.291	0.464	0.438	0.1918
R = .531; *R²* = .282; Adjusted *R²* = .259								
Practices								
Gender	1.048	0.045	0.841	.401	−1.404	3.499	0.042	0.0018
Age	−0.244	−0.166	−1.754	.081	−0.517	0.030	−0.087	0.0076
Marital status	−1.843	−0.089	−1.628	.105	−4.070	0.385	−0.081	0.0066
Educational level	1.193	0.089	1.720	.086	−0.172	2.558	0.085	0.0072
Place of residence	1.290	0.077	1.540	.125	−0.359	2.940	0.076	0.0058
Experience in NICU	2.086	0.224	2.448	.015	0.408	3.764	0.121	0.0146
Hospital sector	−1.578	−0.065	−1.235	.218	−4.092	0.937	−0.061	0.0037
Knowledge	0.073	0.135	2.581	.010	0.017	0.129	0.128	0.0163
Attitudes	0.559	0.449	8.636	.000	0.431	0.686	0.428	0.1831
R = .560; *R²* = .313; Adjusted *R²* = .291								

b = unstandardized beta; B = standardized beta; CI = confidence interval.

participants have fair practice toward ROP. Knowledge and attitudes and practices were predictors of each other's. Also, experience in the NICU was another predictor of practices toward ROP.

Prevention of ROP is required to improve the quality of care in the NICU. Therefore, enhancing educational opportunities and competency-based training programs among NICU nurses about ROP considering risk factors is needed to increase the nurses' knowledge and improve their capabilities about the mechanisms and ways of dealing with ROP. Also, decision-makers should develop policies, protocols, and strategies for preventing ROP. Future studies about ROP and other risk factors such as gestational age, birth weight, type of delivery, and any complications during pregnancy and delivery are recommended. Qualitative studies are needed to explore nurses' experiences with ROP among neonates. Interventional studies could be conducted to assess the effect of educational training programs on the study outcomes.

Author Contributions

Abutrabi. I: Conceptualization; Investigation; Methodology; Supervision; Validation; Writing - original draft; Writing - review & editing. **Ayed. A**: Conceptualization; Methodology; Supervision; Validation; Writing - original draft; Writing - review & editing. **Malak. M:** Data curation; Methodology; Validation; Writing - original draft; Writing - review & editing. **Al-Batran. A:** Methodology; Writing - review & editing.

Availability of Data and Material (Data Transparency)

Not applicable.

Consent to Participate (include appropriate consent statements)

Each participant provided informed consent before beginning the study.

Consent for Publication (Consent Statement Regarding Publishing an Individual's Data or Image)

Not applicable.

Code Availability (Software Application or Custom Code)

Not applicable.

Ethics Approval

All procedures performed in studies involving human participants were by the ethical standards of the institutional and/or national research committee at Ministry of Health at Palestine with reference NO# 162/53/2020.

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Supplemental Material

Supplemental material for this article is available online.

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