

Effect of Evidence Based Education Program on Nurses Performance Regarding Retinopathy of Prematurity in Neonatal Intensive Care Unit

Hanaa M., Ahmed¹, Fatma M., Abdallah²

Lecturer of Pediatric Nursing, Faculty of Nursing, Menoufia University, Egypt¹

Follow of Nursing, National Liver Institute, Menoufia, Egypt²

Abstract: Despite advances in neonatal care, retinopathy of prematurity (ROP) remains a serious problem in premature neonates. Retinopathy is a major consequence of prematurity and very low birth weight newborn. The purpose was to assess the effect of an evidence-based education program on nurses' knowledge & practice regarding retinopathy of prematurity in neonatal intensive care units. **Design:** A quasi-experimental was utilized for this study. **Setting:** This study was conducted in the Neonatal Intensive Care Unit at National Liver Institute, El Menoufia University Hospital, and Shebin El Kom Teaching Hospital. A convenient sample of 60 nurses working in neonatal intensive care units (NICUs) at the previously mentioned setting was selected. Two tools were utilized for this study. **Tool one:** a structured interview questionnaire was used to assess nurses' knowledge about ROP. **Tool two:** an observational checklist was used to assess nursing practice. Results revealed there was an improvement in nurses' knowledge in the post-test than pretest. Total knowledge score and standard deviations were 15.52 ± 4.04 and 24.58 ± 1.49 on the pre, and post-tests respectively. There was high statistically significant difference between nurses' practices at 1% level of statistical significance. **Conclusion:** There was a statistically positive correlation between nurses' knowledge and practices on the post-test. **Recommendation** Ongoing in-service education programs must be designed and implemented at NICUs to improve nurses' knowledge and practices about the prevention of ROP.

Keywords: Evidence-Based Education, Retinopathy, and Prematurity.

1. INTRODUCTION

Retinopathy of prematurity is a potentially blinding eye condition that commonly affects premature infants weighing approximately (1250 grams) or who is born before 31 weeks of gestation. In the United States, over 3.9 million newborn infants are born each year, with about 28,000 weighing less than 234 pounds. Around 14,000–16,000 of these newborns have ROP (American Academy of Ophthalmology, 2022).

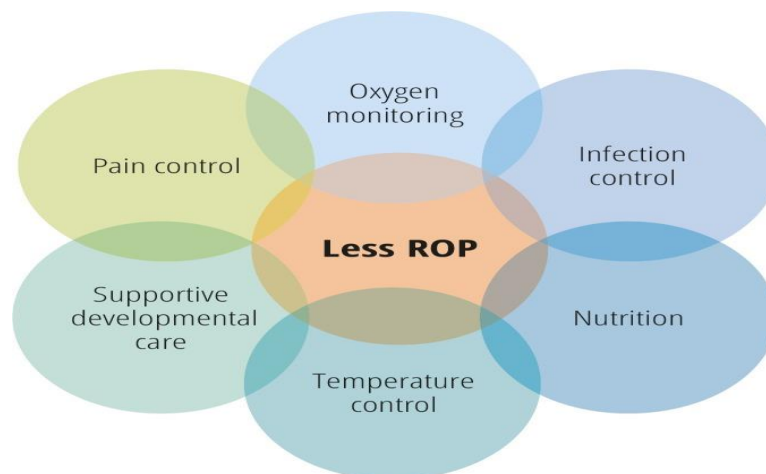
The two most important risk factors for severe ROP are birth weight and gestational age. Anemia, infection, blood transfusions, lung problems, heart illness, and ethnicity can all cause ROP (Molinary et al., 2017). The relationship between growth factor levels in the blood and ROP is currently being researched. Supplemental oxygen, which is often provided to premature neonates, has been related to ROP (American Association for Pediatric Ophthalmology and Strabismus, 2021)

To promote better newborn survival and outcomes, international standards for neonatal care should be established globally. There is potential for developing a cadre of specialist ROP nurses, but there are unfortunately few formal neonatal nursing training programs in our country (Azami et al., 2018). When hospital nurseries began using excessively high quantities of oxygen in incubators to save premature newborns' lives, the ROP epidemic developed. Researchers

observed that reducing the amount of oxygen given to premature newborns reduced their chances of developing ROP (Morgane et al., 2022).

The neonatal intensive care unit's pillars are neonatal nurses (NICU). Their professional skills and experience are critical in delivering best practices in quality treatment for preterm neonates to prevent ROP (Akkawi et al., 2019). Improved care in the NICU can help prevent ROP. Reduced morbidities and risk factors that put a newborn at risk for ROP are the outcome of better care. Pediatricians, medical officers, resident doctors, and neonatal nurses who are involved in the care of these babies are responsible for improving neonatal care. In underdeveloped nations, any action that improves the quality of infant care can help to reduce the prevalence of ROP. This strategy comprises the use of judicious oxygen treatment and blood transfusions, infections, prenatal steroids, and nutrition (UNICEF, 2022).

Skilled neonatal nurses play a critically central role as part of the multi-disciplinary neonatal team caring for preterm newborns (Bindu K Sankar et al., 2021). Nurses can help to prevent ROP by focusing on reducing risk factors and through the day-to-day care they deliver. The use of high quantities of supplemental oxygen in premature newborns can increase the risk of developing reactive oxygen syndrome (National Eye Institute, 2017). Modern procedures may be able to supply levels sufficient to avoid or treat hypoxia, as well as reduce related tissue damage such as ROP. These are highlighted below using the POINTS of Care system.



Quiroga, A and Moxon, S. (2017). Preventing sight-threatening ROP: the role of nurses in reducing the risk. Retrieved from <https://pubmed.ncbi.nlm.nih.gov>

Purpose

The purpose of the study was to assess the effect of evidence based education program on nurse's knowledge regarding retinopathy of prematurity in the neonatal intensive care unit.

Research hypotheses

1- Nurses who receive an evidence-based education program about retinopathy of prematurity will have a higher level of knowledge on the posttest than pretest.

2. METHODS

1- **Research design:** A quasi-experimental design was utilized (pre, and post-test).

2- **Research setting:** This study was conducted in the Neonatal Intensive Care Unit at National Liver Institute, El Menoufia University Hospital, and Shebin El Kom Teaching Hospital in Shebin El Kom City.

3- **Sampling:** A convenient sample of 60 nurses working in neonatal intensive care units (NICUs) at the above-mentioned setting

4.1 **Instruments:** A structured interview questionnaire. It was developed by the researcher guided by the Center for Disease Control and Prevention (CDCP, 2020) to assess nurses' knowledge about ROP. It consisted of three parts

- **Part one:** Demographic characteristics of the studied nurses such as age, level of education, and years of experience.
- **Part two: Nurses' knowledge about ROP.** It contains questions about ROP such as definition, the relationship between the incidence of ROP and gestational age and birth weight, postnatal age before which no ROP develops, indications of ROP screening in newborn, gestational age at which the first screening examination for ROP should be carried out is, age considered for first screening examination for ROP, the concentration of eye drops used for dilating eye before eye examination, time interval for dilating eyes of a neonate before the examination, the normal time interval for follow-up of ROP examination, time for termination of ROP screening, the advised duration of NPO status of the premature infant for ROP examination, classification of ROP, the most preferred method for peripheral retinal ablation (PRA), the prescribed oxygen saturation for a neonate to prevent ROP, the prescribed levels of PaO₂ for a preterm infant on a ventilator, level of HCT below which packed cell transfusion is given to a preterm infant, the recommended dose of Iron in infant, name of the instrument used for ROP treatment, risk factors for ROP
- **Part three: Nurses' Knowledge about the intervention that could contribute to reduction of ROP:** It contains questions about Nursing interventions in the areas of pain control, oxygen administration, infection control measures, Nutrition (feeding in preterm neonates), Temperature control (prevention of hypothermia) and supportive measures such as positioning comfortably, minimizing light and sounds in the NICU,
- Scoring items for each question was zero for incorrect answer and one score for correct answer.
- **Total Scoring system for nurse's knowledge**

● Excellent knowledge	≥85%
● Good knowledge	75% : 85%
● Average knowledge	60% -75%
● Poor knowledge	≤ 60%

4.2- Instruments two: Nurses' observation checklist about intervention that could contribute to reduce of ROP. It was developed by researcher it included 6 nursing practices pain control, infection control measures, nutrition (feeding in preterm neonates), temperature control (prevention of hypothermia), and supportive measures such as positioning comfortably, minimizing light and sounds in the NICU, and blood transfusions.

Scoring system for each item:

Items	Score	Total score
Adequately done	2	> 80%
Inadequately done	1	60-80%
Not done	0	< 60%

The sample size

It was calculated as 60 according to power analysis with $Z_{1-\alpha/2} = 1.96$, $Z_{1-\beta} = 1.64$, $\sigma_1 = 4.34$, $\sigma_2 = 4.27$, $\mu_1 = 21.83$, $\mu_2 = 11.26$, 95% confidence interval and 80% power. The total enumeration sampling was used in the present study. The samples included all nurses working in the NICUs and provide care for preterm neonates.

Validity

For validity assurance, the two instruments were submitted to a jury of five experts in the pediatrics field (two professors, two assistant professors in the pediatric nursing, and one professor in the pediatrics medicine). Content validity was assessed using content validity index average(S-CVI \AVE). The lower limit of acceptability for S-CVI\AVE was 0.80.

Reliability

Internal consistency of the items was evaluated using Cronbach's alpha coefficient ($\alpha \geq 0.85$).

Ethical consideration

- A written consent was obtained from nurses who participated in the study.
- Confidentiality and anonymity of nurses' data were assured through coding all data and put all paper in a closed cabinet.

Pilot study

A Pilot study was carried out on 10% (5 nurses) of the sample to test the practicability, applicability, consistency, clarity, and feasibility of the study instruments to estimate the needed time to fill them. No modifications were done.

Procedure

1- An official permission to carry out the study was issued from the director of setting after submitting an official letter from the Dean of the Faculty of Nursing explaining the purpose of the study and the method of data collection. A meeting was conducted with the director of the setting to obtain permission for conducting the research, explains the purpose and expected outcomes.

2- Data was collected over a period of five months starting from January 2021 until May 2021, the researcher introduced herself to the nurses before starting the assessment of nurses' knowledge were done at the beginning of the study and lasted for 15 days (pretest), knowledge deficit was identified for all nurses.

3- This Evidence-Based Education Program focuses on a set of nursing interventions that aim to decrease the stress of preterm infants in the NICU that may contribute to the development of ROP. The content of the program was developed by reviewing the available literature and finalized after consultation with experts in neonatology pediatrics, and ophthalmology. Nursing interventions in the areas of pain control, oxygen administration, infection control measures, feeding in preterm infants, prevention of hypothermia (emphasizing kangaroo mother care) and supportive measures such as positioning comfortably, minimizing light and sounds in the NICU, clustering of nursing care to promote adequate sleep, nurse's responsibility during screening, treatment of ROP, and parental counseling were discussed in this program WHO, (2017) & Sankar and pappa, (2021). Then translated into the Arabic language by the researcher planned to be provided into three sessions.

- Nurses were divided into 7 small groups. Each group contains 6 nurses and, it consisted of three sessions:

- I. The first session** for the duration of 30 min followed by a discussion for 10 min aimed to provide nurses' with knowledge about ROP.
- II. The second session** for the duration of 20 min followed by a discussion for 15 min aimed to improve nurses' knowledge about intervention to improve quality care of a newborn can contribute to reducing ROP
- III. The third session** of 45 min nursing interventions in the areas of pain control, infection control measures. Nutrition (feeding in preterm neonates). Temperature control (prevention of hypothermia) and supportive measures such as positioning comfortably, minimizing light and sounds in the NICU, and Blood transfusions, session aided by PowerPoint presentation

3. DATA ANALYSIS

Data was coded and transformed into a specially designed form to be suitable for the computer entry process. Data was entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 21. Graphics were done using the Excel program. Quantitative data were presented by mean (X) and standard deviation (SD). ANOVA test for the analysis of variance was used. Qualitative data was presented in the form of frequency distribution tables, numbers and percentages. It was analyzed by chi-square test. The level of significance was set as P value of 0.05 for all statistical tests (Morton et al., 2001).

4. RESULTS

- Figure 1 clarified the educational level of nurses. It is revealed from the figure that the majority of nurses had either bachelor's degree (40.0%) or a diploma (38.4%).

- Figure 2 shows years of experience of nurses. It is clear from the figure that approximately two-thirds of nurses had either 1-4 years of experience (33.3%) or 5-10 years' experience (31.6%).
- Figure 3 presented previous training about ROP. It showed that the majority of nurses (82.0%) didn't receive any training about ROP.
- Table 1 illustrated nurses' Knowledge related to ROP. It showed that there was a highly statistical significant difference between nurses' knowledge on pre and post-test. Also, it was obvious that about half of nurses (45%) had correct knowledge about indications of ROP screening in newborns on pretest compared to the majority of nurses on post-test (91.7%). As illustrated in the table, it was clear that the majority of nurses (96.7%) knew the concentration of eye drops used for dilating the eye before eye examination in the post- test as well as gestational age at which the first screening examination for ROP should be carried out. The highest level of nurses' knowledge was on the post-test. Also, there were highly statistically significant differences between nurses' knowledge on the pre, post, and follow-up tests at 1%⁰ level of statistical significance.
- Furthermore, it was clear that the majority of the studied nurses (90%) had incorrect knowledge about risk factors for ROP compared to 3.3% at posttest. Also, there were highly statistically significant differences between nurses' knowledge on the pre and posttests at 1% level of statistical significance. Also, the knowledge score of studied nurses was excellent regards normal time interval for follow-up of ROP examination (90.0) & time for termination of ROP screening, classification of ROP (86.7 %). The most preferred method for peripheral retinal ablation (91.7%), the prescribed oxygen saturation for a neonate to prevent ROP (95 %), the prescribed levels of PaO₀ for a preterm neonate on the ventilator is (96.7%), The recommended dose of Iron in the infant (100.0%), and name of the instrument used for ROP treatment(95%)
- Table 2 clarified nurses' knowledge about intervention to reduce ROP. It showed that nurses had good knowledge on posttest in relation to Pain& Supportive care (80% & 85%) respectively. but they had average knowledge about Infection control on posttest (68.3%)
- Table 3 and figure 3 illustrated that the mean score of nurses' knowledge on pre and posttests, it showed that there was a highly statistically significant difference between the total mean score of nurses' knowledge on the pre, and post-tests at 1% level of significance. Also, the mean Total knowledge score and standard deviation was 15.52±4.04 and 24.58 ±1.49 on the pre, and posttests respectively
- Table 4: showed comparison between nurses' practices to prevent ROP. As indicated in the table, nurses had the highest level of mean scores of knowledge on the post-test. There were high statistical significant differences between nurses' practices at 1% level of statistical significance.
- Figure 5: represented Pearson correlation between total knowledge score & total practices score on pre and post-test represented correlation between total knowledge score & total practices score on pretest. It revealed that there was a statistically positive correlation between nurses' knowledge and practices on the post-test.

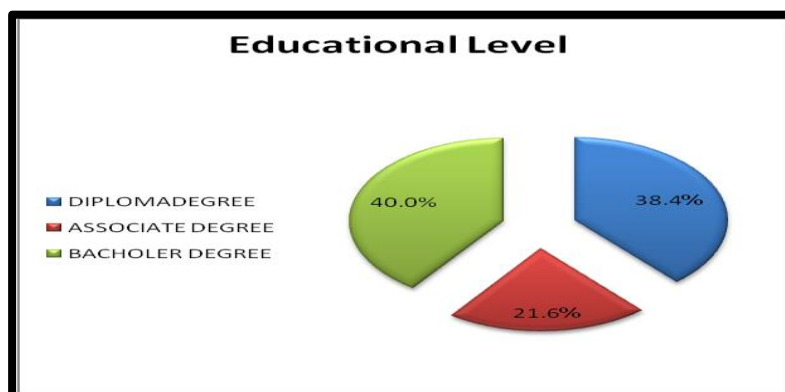


Figure 1: Educational Level of Nurses.

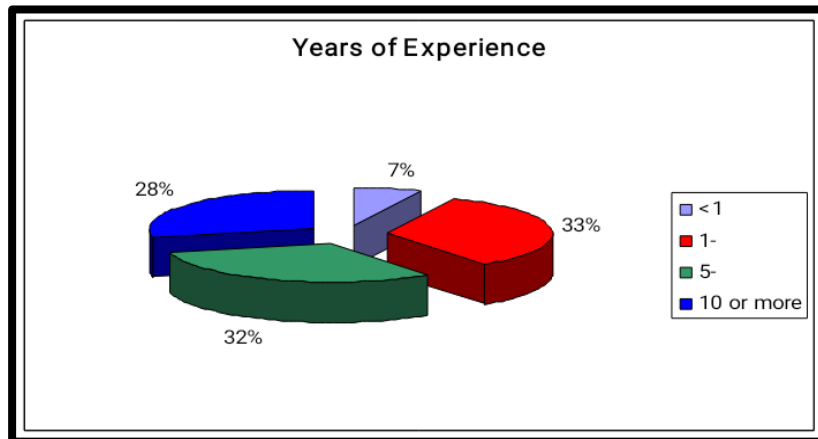


Figure 2: Years of Experience of Nurses

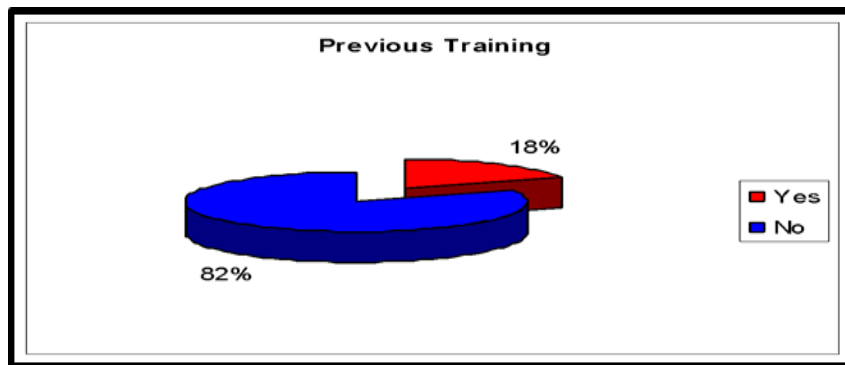


Figure (3):- Previous Training about ROP

Table (1): Nurses' Knowledge related to ROP on Pre and Post-test (No= 60)

Knowledge	Responses								P value
	Pre-test				Post-test				
	Correct		Incorrect		Correct		Incorrect		
	No	%	No	%	No	%	No	%	
1- Definition of ROP	29	48.3	31	51.7	48	80	12	20	< 0.001 **
2- Identification of Risk Factor for ROP	49	81.7	11	18.3	41	68.3	19	31.7	< 0.001 **
3- Relationship between incidence of ROP and gestational age and birth weight.	47	78.3	13	21.7	59	98.3	1	1.7	< 0.001 **
4- Usual postmenstrual age for detection of ROP	44	73.3	16	26.7	58	96.7	2	3.3	< 0.001 **
5- Postnatal age before which no ROP develops	37	61.7	13	38.3	51	85	9	15	< 0.001 **
6- Indications of ROP Screening in Newborn	27	45	33	55	55	91.7	5	8.3	< 0.001 **
7- Gestational age at which the first screening examination for ROP should be carried out is	7	11.7	53	88.3	58	96.7	2	3.3	< 0.001 **
8- Age considered for first screening examination for ROP	44	73.3	16	26.7	57	95	3	5	< 0.001 **
9- Concentration of eye drops used for dilating eye before eye examination	22	36.7	38	63.3	58	96.7	2	3.3	< 0.001 **
10- Time interval for dilating eyes of a neonate before examination	20	33.3	40	66.7	53	88.3	7	11.7	< 0.001 **
11- Normal time interval for follow-up of ROP examination	6	10	54	90	40	66.7	20	33.3	< 0.001 **
12- Time for termination of ROP screening	35	58.3	25	41.7	54	90	6	10	< 0.001 **

13- Duration of NPO status of baby for ROP examination	0	0.0	60	100	0	0.0	60	1.00	----
14- Classification of ROP	11	18.3	49	81.7	52	86.7	8	13.3	< 0.001 **
15- The most preferred method for peripheral retinal ablation (PRA)	26	43.3	34	56.7	55	91.7	5	8.3	< 0.001 **
16- The prescribed oxygen saturation for a neonate to prevent ROP	18	30.3	42	70	58	96.7	2	3.3	< 0.001 **
17- The prescribed levels of PaO2 for a preterm neonate on ventilator is	24	40	36	60	58	96.7	2	3.3	< 0.001 **
18- Level of HCT below which packed cell transfusion is given to a preterm newborn	20	33.3	40	66.7	50	83.3	10	16.7	< 0.001 **
19- The recommended dose of Iron in infant	37	61.7	23	38.3	60	100	0	0.0	< 0.001 **
20- The key factor in the outcome of ROP	29	48.3	31	51.7	41	68.3	19	31.7	< 0.05 *
21- Name of the instrument used for ROP treatment	44	73.3	16	26.7	58	96.7	2	3.3	< 0.001 **

NB: **p<0.001 high statistical significance at 1% level

Table 2: Nurses' Knowledge about intervention to reduce of ROP (No=60)

Nurses' Knowledge about intervention to improve quality care of a newborn and can contribute to reducing of ROP	Responses								P value
	Pre-test				Post-test				
	Correct		Incorrect		Correct		Incorrect		
	No	%	No	%	No	%	No	%	
1- Pain	20	33.3	40	66.7	54	90.0	6	10.0	< 0.001 **
2-Infection control	35	58.3	25	41.7	50	83.3	10	16.7	< 0.001 **
3- Nutrition	7	11.7	53	88.3	59	98.3	1	1.7	< 0.001 **
4-Temperature control	44	73.3	16	26.7	58	96.7	2	3.3	< 0.001 **
5-Supportive care	37	61.7	13	38.3	51	85	9	15	< 0.001 **
6- Blood transfusion	40	77.6	20	33.3	53	88.3	7	11.7	< 0.001 **

Table 3: Mean Score of Nurses' Knowledge on Pre and Post Tests

Total Score Of Nurses' Knowledge	Pre $\bar{x} \pm SD$	Post $\bar{x} \pm SD$	P Value
1- Nurses' knowledge about of ROP	11.83±3.48	18.52±2.1	<0.001 **
2-Nurses' Knowledge about intervention that could contribute to reduce of ROP	3.78±1.64	6.12±1.12	<0.001 **
3- Total knowledge score	15.52±4.04	24.58 ±1.49	<0.001 **

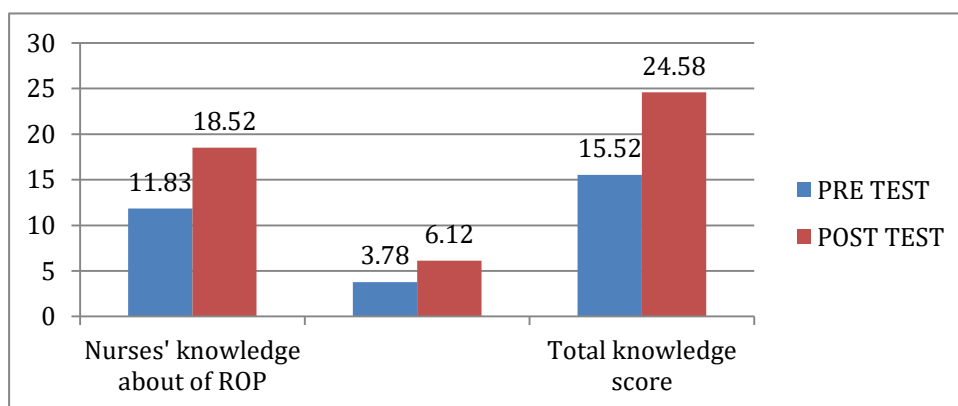


Figure 4: Total Score of Nurses' Knowledge

Table 4: Comparison between Nurse's Practices intervention to reduce of ROP during Pre, and Post test

Nursing practice	Pre		Post		X ²	P Value
	No.60	No %	No. 60	No %		
I- Pain Control					9.82	<0.001 **
● Not Done	26	43.3	23	38.3		
● Inadequately Done	10	16.7	1	1.7		
● Adequately Done	24	40.0	36	60.0		
II-Infection Control					80.96	<0.001 **
● Not Done	0	0.0	0	0.0		
● Inadequately Done	26	43.3	10	16.7		
● Adequately Done	34	56.7	50	83.3		
III-Temperature Control					132.65	<0.001 **
● Not Done	10	16.7	0	0.0		
● Inadequately Done	50	83.3	0	0.0		
● Adequately Done	0	0.0	60	100.0		
IV-O₂ therapy					126.97	<0.001 **
● Not Done	0	0.0	0	0.0		
● Inadequately Done	59	98.3	0	0.0		
● Adequately Done	1	1.7	60	100.0		
V- Blood Transfusion					118.75	<0.001 **
● Not Done	0	0.0	0	0.0		
● Inadequately Done	26	43.3	0	0.0		
● Adequately Done	34	56.7	60	100.0		
VI-Nutrition					2.88	>0.05 ^{ns}
● Not Done	0	0.0	0	0.0		
● Inadequately Done	3	5.0	0	0.0		
● Adequately Done	57	95.0	60	100.0		
VII- Supportive Care					2.03	>0.05 ^{ns}
● Not Done	0	0.0	0	0.0		
● Inadequately Done	60	100.0	1	1.7		
● Adequately Done	0	0.0	60	100.0		
Total Practices Score					80.0	<0.001 **
● Not Done	35	58.3	0	0.0		
● Inadequately Done	22	36.7	12	20.0		
● Adequately Done	3	5.0	48	80.0		

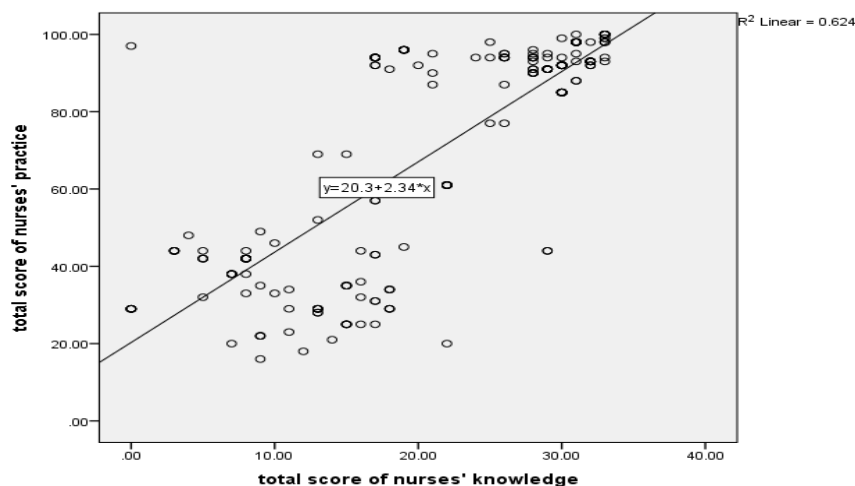


Figure 5: Pearson Correlation between Total Knowledge Score & Total Practices Score on Pre and Post-test.

5. DISCUSSION

Prematurity-related retinopathy (ROP) is a theoretically preventable cause of persistent, and frequently total, blindness in premature infants. In middle-income nations and Southeast Asia, it is a leading cause of blindness in children, with long-term effects for the child and family (The International Agency for the Prevention of Blindness, 2021).

Concerning the level of education, it was noted that the majority of nurses had either bachelor's degree (40.0%) or a diploma (38.4%). These results were corresponding with Sankar and Pappa, (2022) who showed that 46.8 percent of bachelor's degrees. Besides, Metreş et al., (2019) stated that 50% of them had bachelor's degrees.

These findings could be the outcome of healthcare systems canceling secondary nursing school programs because they were deemed too young to provide lifesaving therapies and effectively manage children's and their families pain. As a result, these nurses required further education and training in order to fulfill their responsibilities and provide superior care. In relation to the nurse's experience in the NICU, one-third of the nurses surveyed (33%) reported they had worked as NICU nurse for an average of one to five years. This matched Sankar et al., (2022) finding's which found that 37.50 percent of nurses had worked in a NICU. It was obvious that 82% of nurses had never attended a workshop, conference, or seminar.

Regarding Nurses' Knowledge related to ROP on pre and post-test. On the pretest, about half of the nurses (48.3%) were able to accurately define ROP. These findings are consistent with Thuileiphy et al., (2021) who said that most NICU nurses had limited awareness of ROP. This suggests that nurses were not familiar with the WHO's evidence-based clinical practice guidelines for the care of retinopathy of prematurity from 2021 and WHO's clinical practice guidelines for the management of retinopathy of prematurity from 2017. These findings demonstrated the need for nurses to have up-to-date knowledge of ROP, prevention, and management through the presenting of ROP information through seminars and educational sessions.

In relation to risk factors for ROP, it was noted that most nurses (68.3%) had correct knowledge about risk factors for ROP on the pretest. In addition, 61.7 percent of them had incorrect knowledge about the postnatal age at which ROP occurs, and the majority of nurses (73.3 percent) had incorrect knowledge about the age at which ROP should be first screened. Thuileiphy, et al., (2021) found that the majority of nurses had accurate understanding of ROP risk factors. However, he demonstrated that the majority of them were unaware of the postnatal age before which no ROP develops and the age considered for the first ROP screening check (71 percent & 83 percent respectively). This shows that the instructional intervention was effective to improve their knowledge.

Furthermore, on the pretest, it was discovered that one-third of the nurses had a proper understanding of the necessary oxygen saturation for a neonate to prevent ROP. Meanwhile, on the pretest, over two-thirds of them (73.3 percent) knew the name of the device used for ROP treatment correctly.

This finding is comparable to that of Mehta, et al., (2018) who discovered that 32.5% and 90 % of nurses, respectively, provided correct responses prior to intervention for prescribed oxygen saturation levels for newborns treated for ROP. Also, according to Shukla et al., (2020) ensuring that every eligible preterm newborn in neonatal intensive care receives a timely ROP diagnostic and treatment is critical to their survival. These results could be explained by the fact that the nurses were more realistic.

In terms of the relationship between nurses' knowledge of ROP on pre and posttest, the results showed that there were highly statistically significant variations between nurses' knowledge on pre and post-test at the 1% level of statistical significance. Such findings were consistent with those of Sivaramudu et al., (2019) who discovered that the post-test knowledge score was significantly greater than the pretest knowledge score. These findings could be related to the fact that no nurses attended any ROP workshops, conferences, or seminars. It was determined that the educational program was successful in increasing the nurse's knowledge. As a result, it is recommended that they begin using educational interventions on a regular basis to improve their knowledge and, as a result, make changes in their clinical practice.

On the basis of a pre-and post-test comparison of nurses' awareness of interventions that can help reduce ROP between pre-and post-test, there were highly statistically significant differences in nurse understanding of therapies that can help minimize ROP, according to the findings of this study. This could be attributed to the evidence-based retinopathy of

prematurity education program's success in raising nurse awareness of ROP-prevention nursing therapies. These findings could be explained by a dearth of preterm infant-friendly nurse practices and ROP standards on their units. Despite the fact that nurses need experience in newborn critical care practices to provide high-quality treatment, there was a scarcity of nurses.

In relation to the comparison between mean scores of nurses' knowledge on pre, post-tests, the current study's findings showed that nurses' knowledge had greatly improved after the post-test. On the pre-and post-tests, the mean total knowledge score and standard deviation were 15.52 ± 4.04 and 24.58 ± 1.49 respectively. Sankar, et al., (2022) discovered extremely statistically significant differences between the Mean (SD) of the pretest and the Mean (SD) of the post-test ($p < 0.001$ level). Nurses' understanding was improved as a result of the education program. To ensure that ROP can be considered an indicator for "quality of care" offered to preterm babies, continual reinforcement would be required to create a greater degree of professionalism and provide standardized premature infant care. Nurses must stay up to date on the latest developments in preterm care. Clinical Practice Guidelines by WHO, (2022) and other professional groups can help educate nurses about this increasing concern.

In terms of comparing average outcomes from pre-and post-tests of nurses' knowledge following the post-test, the nurses' knowledge had significantly improved, according to the findings of the current study. On the pre and post-tests, the mean total knowledge score and standard deviation were 15.52 ± 4.04 and 24.58 ± 1.49 , respectively. Sankar, et al., (2022) showed that the difference between the Mean (SD) of the pretest and the Mean (SD) of the posttest is extremely statistically significant ($p = 0.001$ level). Nurses' understanding has improved as a result of the education program. Continuous reinforcement would be required to maintain a higher level of professionalism and provide standardized premature infant care, allowing ROP to be used as a measure of "quality of care" provided to preterm neonates.

According to the comparison between nurses' practices to prevent ROP As it noted that more than half of the studied nurses sixty percent control pain adequately on post-test during taking blood, setting up drips, and inserting a nasogastric tube are all uncomfortable procedures that might destabilize premature newborns. Painful treatments should be kept to a bare minimum, so, it is supported by Moxon & Quiroga, (2017) pain can be alleviated by giving the infant an oral sucrose solution or a pacifier to suck on prior to the surgery. Systemic analgesics can be utilized for really painful treatments. Regards control of infection it was clear that more than one-third forty-three percent of them inadequately controlled infection on the pretest. Because preterm newborns are significantly more vulnerable to infections than grownups and are less able to resist it, it is highly suggested to improve them by preventing infection. Early-onset infection (within 48 hours of birth) is most frequently acquired during childbirth.

Furthermore, cross-infection inside the neonatal unit is the most common cause of late-onset infection. Hand cleaning before and after entering the unit, oxygen monitoring, and diet are all important in preventing late-onset infection. After caring for each infant, adjust the temperature. Visitors and medical specialists were included in this. Other ways to avoid infection include strict skin preparation before drawing blood or arranging a drip, making sure no toys or other devices are left in the crib and avoiding broad-spectrum medications.

In relation to temperature control, it was noted that all nurses adequately did it on the post-test. Such findings showed that an evidence-based education program is a relevant content to the adequate accomplishment of this practice as preterm infants are unable to shiver if they become cold. They compensate by consuming extra oxygen. Also, nurses can control the environment by minimizing draughts, employing incubators, and using caps and warmed cribs. Plastic bags could be used. Kangaroo care (is a nurse-led practice that helps them keep their body temperature stable).

As regard, the Pearson correlation between total knowledge & practices scores on pre & post-test. It revealed that there was a statistically positive correlation between nurses' knowledge and practices on the post-test. This finding could be related to the strict supervision from their head nurses. Also, the majority of the studied nurses were interested in the nature of their work. Therefore, continuous reinforcement would be necessary to achieve a higher level of professionalism and provide standardized patient care.

6. CONCLUSION

Based on the finding of the study it was concluded that nurses who receive an evidence-based education program about retinopathy of prematurity had a higher level of knowledge on the post-test than pre-test

7. RECOMMENDATIONS

- Nurses' knowledge and practices about ROP prevention must be improved through ongoing in-service education & training programs in NICUs.
- Standardized clinical practice guidelines protocol of care for premature infants should be followed at NICUs to prevent ROP
- Nurses should have access to publications, journals, computers, and the internet in their units.
- Future studies are recommended on a larger sample to accomplish generalization of the study results.

REFERENCES

- [1] Abate., et al. (2021). Effects of therapeutic hypothermia on death among asphyxiated neonates with hypoxic-ischemic encephalopathy: a systematic review and meta-analysis of randomized control trials. 2021; 16e0247229
- [2] Akkawi MT, Shehadeh MM, Abu Shams AN, Al-Hardan DM, Omar LJ, Almahmoud OH, et al. Incidence and risk factors of retinopathy of prematurity in three neonatal intensive care units in Palestine. *BMC Ophthalmol.* 2019;19:189
- [3] AlBalawi, HB., AlBalawi, NS., AlSuhaimi NA, et al. (2020). Incidence and risk factors for retinopathy of prematurity in Tabuk City, KSA. *Middle East Afr J Ophthalmol.* 2020; 27(2):105–109.
- [4] American Academy of Ophthalmology. (2022). ROP: Retinopathy of Prematurity Diagnosis and Treatment <https://www.aaopt.org/eyehealth/diseases/retinopathy-prematurity-diagnosis>
- [5] Azami M, Jaafari Z, Rahmati S, Farahani AD, Badfar G. Prevalence and risk factors of retinopathy of prematurity in Iran: A systematic review and meta-analysis. *BMC Ophthalmol.* 2018;18:83. - PMC - PubMed
- [6] Binenbaum G, Tomlinson LA, de Alba Campomanes AG et al. Validation of the Postnatal Growth and Retinopathy of Prematurity Screening Criteria. *JAMA Ophthalmol.* 2019;138:31–.
- [7] Center for Disease Control and Prevention (CDCP). (2020). Available at <https://www.ncbi.nlm.nih.gov/> IN Deorari, A. & Darlow, B. (2017). Preventing sight-threatening ROP: a neonatologist's perspective, *Community Eye Health* 30(99); 2017
- [8] Facts about retinopathy of prematurity (ROP). National Eye Institute. <https://nei.nih.gov/health/rop/rop>. Accessed July 27, 2017.
- [9] Fang, et al. (2016). Interventions To Prevent Retinopathy of Prematurity: A Meta-analysis, *Pediatrics* (2016) 137 (4): <https://doi.org/10.1542/peds.2015-3387>
- [10] Fierson, WM. (2018). American Academy of Pediatrics Section on Ophthalmology.[21] Screening examination of premature infants for retinopathy of prematurity. *Pediatrics.* 2018; 142(6):e20183061.
- [11] Goyal, A., Giridhar, A and Gopalakrishnan, M. (2017). Real-world scenario of retinopathy of prematurity in Kerala. *Kerala J Ophthalmol* 2017;29:30-4.
- [12] Honavar, SG. (2019). Do we need India-specific retinopathy of prematurity screening guidelines? *Indian J Ophthalmol.* 2019;67:711-16.
- [13] Kalyan, G and Moxon, S. (2016). The Role of Neonatal Nurses in the Prevention of Retinopathy of Prematurity, *Indian Pediatrics* 2016 (53)
- [14] Metreş, O., Aykanat-Girgin, B and GOzen, D. (2019). What do neonatal nurses know and feel about pain management during retinopathy of prematurity examination: A qualitative research. *FNJN Florence Nightingale Journal of Nursing*, 27(2): 133-142.
- [15] Ministry Of Health & Family Welfare Government Of India,2017: Guidelines For Universal Eye Screening In Newborns Including Retinopathy Of Prematurity

International Journal of Novel Research in Healthcare and Nursing

 Vol. 9, Issue 1, pp: (279-291), Month: January - April 2022, Available at: www.noveltyjournals.com

- [16] Ministry of Health (2018). National guidelines for Screening and Management of Retinopathy of Prematurity in Kenya. Nairobi.
- [17] Molinary A, Weaver D, Jalali S. Classifying retinopathy of prematurity. *Community Eye Health*. 2017;30:55–6.
- [18] Morton et al., (2001). Nurses' knowledge about intervention that can contribute to reduce of ROP family (The International Agency for the Prevention of Blindness (IAPB), 2021 London,, United Kingdom
- [19] Murki, S and Kadam S. (2018). Role of neonatal team including nurses in prevention of retinopathy of prematurity. *Community Eye Health*. 2018;31(101):11-15.
- [20] Palmer EA, Flynn JT, Hardy RJ, et al. Incidence and Early Course of Retinopathy of Prematurity. *Ophthalmology*. 2020;127:S84–S96.
- [21] Parappil, h., et al. (2019). Management of retinopathy of prematurity in a neonatal unit: Current approach. 2019 ;8 (4) : 203-211
- [22] Quiroga A and Moxon S. (2017). Preventing sight-threatening ROP: the role of nurses in reducing the risk, *Community Eye Health*. 2017; 30(99): 53–54.
- [23] Radhakrishnan N, Pillai GS, Kiran KR, Lekshmypriya A. Retinopathy of prematurity-An overview. *Kerala J Ophthalmol*. 2017;29:154–9.
- [24] Raghuvveer,T and Zackula, R. (2020). Strategies to Prevent Severe Retinopathy of Prematurity: A 2020 Update and Meta-analysis. 2020 Apr;21(4):e249-e263. doi: 10.1542/neo.21-4-e249.
- [25] Raiturcar, TP., Cacodcar, JA., Dubbashi, A and Aguiar, M. (2019). Knowledge, attitude and practice study on awareness of retinopathy of prematurity among pediatricians in Goa. *Journal of Clinical Neonatology* 2019(8)106-9.
- [26] Rashtriya, B and Swasthya, K. (2020). Ministry of Health & Family Welfare [Government of India. Guideline for universal eye screening in newborn including Retinopathy of Prematurity [Internet]. June 2017 [cited 2020 Jun 3]. Available from: https://nhm.gov.in/images/pdf/programmes/RBSK/Resource_Documents/ Revised_ROP_Guidelines -Web_Optimized.pdf.
- [27] Roberts D, Brown J, Medley N, Dalziel SR. Antenatal corticosteroids for accelerating fetal lung maturation for women at risk of preterm birth. *Cochrane Database of Systematic Reviews* 2017, Issue 3. Art. No.: CD004454. DOI: 10.1002/14651858.CD004454
- [28] Sai Kiranmayee P, Kalluri V. India to gear up to the challenge of third epidemic of retinopathy of prematurity in the world. *Indian J Ophthalmol*. 2019;67:726–31.
- [29] Sankar, K and Pappa P. (2018). Study to Assess the Knowledge regarding Retinopathy of Prematurity among Staff nurses in a Tertiary Care Centre, Kerala. *Int. J. Nur. Edu and Research*. 2018; 6(3): 253-255
- [30] Sankar, T et al. (2022). Effectiveness of Developmentally Supportive Education Program on Nursing Knowledge of Retinopathy of Prematurity in Neonatal Intensive Care Unit, © 2022 Iranian Journal of Nursing and Midwifery Research | Iranian Journal of Nursing and Midwifery Research | Volume 27 : Issue 1
- [31] Shukla, G., Gilbert, C., Vidyadhar, B., Mukpalkar, S. (2019). Operational guidelines for ROP in India, *Indian Journal of Ophthalmology*: February 2020 - Volume 68 - Issue Suppl 1 - p S108-S111 doi: 10.4103/ijo.IJO_1827_19
- [32] Singh A. RBSK, Ministry of Health and Family Welfare. New Delhi: Government of India; 2017. Guidelines for Universal Eye Screening in New-Borns Including Retinopathy of Prematurity. Available from: <https://www.researchgate.net/publication/307216617> .
- [33] Sivaramudu K, Sravya R, Mrudula Y, Manohar B, Pradeep Prospective observational study of retinopathy of prematurity in a tertiary care hospital, Tirupati. *Evi Based Med Healthc*. 2019;6:2989–93.
- [34] Somogyvari Z, Maka3 E and Nagy, Z. (2019). Training Hungarian neonatal transport nurses in screening for retinopathy of prematurity with telemedicine, *Developments in Health Sciences* 2(3), pp. 65–71 (2019)

International Journal of Novel Research in Healthcare and Nursing

Vol. 9, Issue 1, pp: (279-291), Month: January - April 2022, Available at: www.noveltyjournals.com

- [35] Sweet DG, Carnielli V, Greisen G, et al. European Consensus Guidelines on the Management of Respiratory Distress Syndrome – 2019 Update. *Neonatology*. 2019; 115: 432–450.
- [36] Tallanao, T et al., (2021). A descriptive survey on knowledge gap related to retinopathy of prematurity and its prevention and management among nurses in a tertiary care hospital, *Indian J Ophthalmol*. 2021 Aug; 69(8): 2122–2125.
- [37] Unicef, (2022). Unicef for Every Child, Target Product Profile, For Retinopathy of Prematurity (ROP) Imaging Device, 1st ED, February, 2022.
- [38] Walinjkar, JA. (2021). Commentary: Knowledge gap among nurses related to retinopathy of prematurity and its prevention and management. *Indian J Ophthalmology* 2021; 69:2125
- [39] WHO, (2017). Clinical Practice Guidelines for the Management of Retinopathy of Prematurity. Summarized Version, Pan American Health Organization, Washington
- [40] WHO, (2021). Evidence-Based Clinical Practice Guidelines for the follow-Up of at-Risk Neonates © Pan American Health Organization