

## Effectiveness of Developmentally Supportive Education Program on Nursing Knowledge of Retinopathy of Prematurity in Neonatal Intensive Care Unit

### Abstract

**Background:** Retinopathy of Prematurity (ROP) is a preventable cause of childhood blindness. India accounts for nearly 10% of the worldwide estimate of blindness and visual impairment due to ROP. Nurses are pillars of neonatal intensive care units (NICUs) and play a critical role in the prevention and management of ROP. The primary aim of this study was to evaluate the effect of developmentally supportive education program on knowledge regarding prevention and management of ROP among nurses working in NICU. **Materials and Methods:** A hospital based pre-experimental, one group pre-test–post-test study was carried out among 32 staff nurses working in the NICU of a tertiary care center during January to February 2019. Knowledge regarding the prevention and management of ROP was assessed before and after the implementation of developmentally supportive education program using a structured knowledge questionnaire. **Results:** Pre-test knowledge score was mean (Standard Deviation [SD]) 9.00 (3.68) and after the educational program post-test knowledge score was found to be mean (SD) 14.53 (2.39). Paired *t*-test was used to evaluate the effect of developmentally supportive education program and was found to be statistically significant ( $t_{32} = 10.09, p < 0.001$ ). **Conclusions:** Developmentally supportive educational program can be used as an effective intervention for improving the knowledge regarding ROP among nurses in NICU.

**Keywords:** Educational, program, knowledge, Intensive Care Units, Neonatal, Retinopathy of Prematurity

### Introduction

Retinopathy of Prematurity (ROP) is a vasoproliferative disorder, characterized by abnormal and uncontrolled development of blood vessels in the immature retina of preterm infants.<sup>[1]</sup> It is an emerging public health problem in the developing countries. Annually, 15 million babies are born preterm worldwide and the highest is in India (3.5 million). Moreover, India has the third highest incidence of low birth weight with 1.7 million weighing less than 2500 g. Premature birth and low birth weight predispose a new born to ROP. It is estimated that 2 lakh children are at the risk of developing ROP in India every year.<sup>[2]</sup> The prevalence ranges from 38% to 51.9% among low birth weight babies, but varies significantly among different parts of the country. ROP-associated blindness contributes to 40% of childhood blindness.<sup>[3]</sup> The prevention of blindness in children is considered a high priority in “Vision 2020,” which is a global initiative by the World

Health Organization to eliminate avoidable blindness by 2020.

Due to advancements in technology and improvement in neonatal care, more and more preterm babies are surviving now and consequently the incidence of ROP is increasing.<sup>[4]</sup> Currently, low-and middle-income countries including India are facing the challenge of third epidemic of ROP. Screening guidelines for ROP vary from region to region; and studies from India have shown that bigger and more mature babies develop ROP.<sup>[5]</sup> Vision, being an important sensory function, influences the neurodevelopmental outcome of children and can have enormous impact on the quality of life of affected infants.<sup>[6]</sup> A delay in the identification and treatment of ROP can lead to visual impairment. The majority of ROP cases regress normally and it is reported that almost 90% of stage I and II ROP do not require any treatment. Babies with treated ROP need regular follow-up as they are at risk for developing

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long-term sequelae including myopia, astigmatism, anisometropia, amblyopia, cataract, glaucoma, strabismus, and retinal detachment. The prevalence of myopia in infants with severe ROP and in eyes treated with laser photocoagulation were 58% and 70% respectively. High prevalence of astigmatism is also a common problem after laser treatment. It has been reported that around one-third of the children with ROP develop strabismus. This evidence emphasizes the importance of regular follow-up of preterm babies during their early years of life.<sup>[7]</sup>

ROP can be considered as an indicator for “quality of care” provided to preterm babies. Nurses function as the backbone of the NICU. As ROP is multifactorial and many of the risk factors are mediated by nursing interventions, standard nursing care may reduce the incidence of this disease. In countries such as India, neonatal super specialty training is relatively new for nurses and they neither know much about ROP nor appreciate their role in prevention of ROP in preterm babies they are routinely caring for.<sup>[8]</sup> Developmentally supportive care emphasizes the role of parents in neonatal care. Mothers are often allowed to visit their babies in NICU and participate in their child care under the supervision of nurses. This helps in developing confidence in handling these tiny babies. Nurses act as counselors for the parents by providing necessary information regarding the disease process, further interventions, importance of consistent care and follow-up, monitoring of visual acuity, and surveillance for complication. Although nurses have a pivotal role in the prevention and management of ROP, their knowledge and skill in this area have not been explored adequately. As far as the researcher’s knowledge and expertise, there is no published scientific evidence from India regarding this problem. However, the authors could find one unpublished post graduate thesis conducted in Karnataka state, India. Educational as well as competency-based training programs are essential to empower nurses for providing evidence-based neonatal care.<sup>[8]</sup> The purpose of the present study is to evaluate the effect of developmentally supportive education program on knowledge regarding prevention and management of ROP among nurses working in NICU.

## Materials and Methods

A hospital based pre-experimental study was carried out among staff nurses working in the NICU of a tertiary care center during January to February 2019. One group pre-test post-test design was used in this study. The intervention, developmentally supportive education program was designed by the investigator, which included a lecture session aided by power point presentation for a duration of 45 min followed by a discussion for 15 min. This 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 babies, 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. The study was conducted in a 16-bedded NICU of a tertiary care hospital in central Kerala. This is a referral center and Government Medical College hospital. The sample size was calculated as 32 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 sample included all registered nurses working in the NICU, except those on long leave (three nurses). A Structured Knowledge Questionnaire was prepared by the investigator for assessing the knowledge of nurses. The instrument contained 20 items (three items regarding ROP in general, five items regarding classification of ROP, three items on complication, four items on risk factors, and five items on nurses role in prevention and screening of ROP). Each correct answer was scored one (1) and zero (0) for wrong answer. The content validity index was found to be 0.87 and the reliability of the questionnaire was established by Cronbach’s alpha of 0.81. The approval of this study from the Scientific Review Committee, Institutional Ethics Committee and administrative sanction from hospital authority were obtained. The investigator met the participants in the discussion room near to the NICU, explained the purpose of the study, and an informed consent was taken. Two sessions of education program were arranged considering the duty schedule of nurses. Night duty and morning duty staff were gathered in the morning and the rest of the staff were collected in the evening on the same day. The participants were instructed to fill the sociopersonal data sheet and then the structured knowledge questionnaire was distributed to assess the pretest knowledge. After that, developmentally supportive education program was implemented. A post-test was conducted after 14 days of pre-test. All analyses were done using SPSS version 16 (SPSS Inc., Chicago, IL., USA). An alpha level of 0.05 was used to determine statistical significance. Sociopersonal variables of registered nurses were analyzed using descriptive statistics and shown as frequency and percentages. The level of knowledge was arbitrarily classified as good (14–20), average (7–13), and poor (0–6) based on the scores obtained. Paired *t*-test was used to study the effectiveness of developmentally supportive education program on knowledge regarding the prevention and management of ROP.

## Ethical consideration

Ethical sanction was obtained from the Institutional Ethics Committee (IEC no. B1/312/2015/CONTSR) dated

on 19.06.15 (valid up to 2021). The authors committed themselves to avoiding plagiarism in the entire article, refraining from deliberately manipulating the data or analyses, and data making or fabrication, and maintaining honesty, objectivity, integrity, and caution.

## Results

Table 1 shows the frequency and percentage of demographic variables. More than half (59.40%) of nurses had an average level of knowledge and 31.20% had poor knowledge regarding the prevention and management of ROP before intervention with mean (Standard Deviation [SD]) 9.00 (03.68) [Table 2]. After the intervention, most of the sample (68.80%) had good knowledge and none of them had poor level of knowledge mean (SD) 14.53 (02.39). Paired *t*-test was used to evaluate the effect of developmentally supportive education program and was found to be statistically significant ( $t_{32} = 10.09$ ,  $p < 0.001$ ). The Chi-square test of independence showed that there was no significant association between pre-test knowledge score and age ( $\chi^2 = 0.26$ ,  $df = 1$ ,  $p < 0.05$ ) education ( $\chi^2 = 0.55$ ,  $df = 1$ ,  $p < 0.05$ ), and year of experience ( $\chi^2 = 0.90$ ,  $df = 1$ ,  $p < 0.05$ ) [Table 3].

## Discussion

The role of nursing staff is crucial for the successful prevention of ROP induced blindness as they are responsible for monitoring the oxygen targets, feeding of babies, maintaining optimum body temperature, and adopting infection control measures during routine care. They are the key persons involved in counseling the parents regarding the importance of follow-up after discharge. Until now, authors could not find any published nursing interventional studies to improve the knowledge regarding ROP among nurses.<sup>[9]</sup> We hope this study could be a step in enhancing the knowledge among neonatal nurses. Community health nurses also should be trained so that they can create public awareness and take all the necessary measures for preventing preterm deliveries through proper antenatal care and timely referral of high-risk pregnancies. As a member of multidisciplinary team, nurses are now effectively trained in the tele screening of ROP using RET-CAM in rural areas and utilized for screening of ROP where experts are not available.

The authors could find only one nursing study, which is an unpublished PG thesis conducted in Mangalore on "Effectiveness of Self-Instructional Module Regarding Early Detection and Management of ROP Among Staff Nurses." The results showed that the highest percentage of staff nurses had average knowledge and 3.3% had poor knowledge regarding the early detection and management of ROP, whereas the post-test revealed more than half of them gained very good knowledge, and 36.67% of them gained good knowledge after the intervention. Pre- and post-test knowledge score statistically tested

**Table 1: Frequency and percentage distribution of nurses based on their sociopersonal variables**

(n=32)	
Socio personal variables	n (%)
Age in years	
20-30	21 (65.63)
31-40	10 (31.25)
41-50	01 (03.12)
Qualification	
Diploma in Nursing	14 (43.75)
BSc Nursing	15 (46.88)
MSc Nursing	03 (09.37)
Experience in NICU*	
<2 years	17 (53.12)
2-5 years	12 (37.50)
>5 years	03 (09.38)

\*Neonatal Intensive Care Unit

**Table 2: Comparison of pre-test and post-test knowledge scores of nurses regarding prevention and management of ROP\***

(n=32)			
Mean (SD) of pre-test	Mean (SD) of post-test	t	p
09.00 (03.68)	14.53 (02.39)	10.09***	0.001

\*Retinopathy of prematurity, \*\*\*significant at  $p < 0.001$  level.

**Table 3: Association of pre-test knowledge score with selected demographic variables**

Variable	$\chi^2$	df	p
Age	0.26*	1	0.877
Education	3.03*	1	0.552
Years of Experience	0.91*	1	0.923

\*Not significant at  $p < 0.05$ .

by paired *t*-test and found highly significant ( $t_{30} = 25.13$ ,  $p \leq 0.05$ ).<sup>[10]</sup> The present study findings are also in consistent with this study results. Post-test knowledge score mean (SD) 14.53 (2.39) was significantly higher than the pre-test knowledge mean (SD) 9.00 (3.68), which showed that the educational program was effective in improving the nurses knowledge ( $t_{32} = 10.09$ ,  $p < 0.001$ ). The authors concluded that educational interventions are helpful for strengthening the knowledge and thereby making changes in clinical practice.

There are many descriptive studies conducted among pediatricians in different parts of the world to assess their knowledge and practice regarding ROP, but the findings are disappointing. A study was conducted in Coimbatore, India, to analyze the awareness regarding ROP among pediatricians. The results showed that 41% of the sample had no idea as to which part of the eye is affected in ROP and 45.8% of them did not know when ROP screening should be started, even 28.9% of them responded that ROP

is not preventable.<sup>[11]</sup> In the present study, more than half of the (56.1%) nurses were aware of the affected part of the eye in ROP but the timing of first screening was not known by 62% of nurses. Although ROP screening is routinely done in the NICU, the majority of nurses working there lack knowledge in the areas such as screening guidelines and classification of ROP, treatment available, and their role in prevention of risk factors. This may be due to many reasons; screening is done by ophthalmologists and nurses feel a gap because of their less awareness, which needs to be bridged. The researcher could find another study to analyze the level of knowledge, attitude, and practice of 70 pediatricians about ROP in West Bank, Palestine. The study findings showed that the majority of pediatricians had less information about ROP screening guidelines and service delivery. Nine (12.9%) pediatricians had no idea that which part of the eyes are affected in ROP, whereas 35.7% of the participants did not know about the treatment modalities. This study recommends the need for dissemination of knowledge through publishing articles, attending seminars, and conducting educational programs. Nurses, pediatricians, and ophthalmologists should attend these programs regularly, and coordinated effort of these activities by all involved in preterm baby care is mandatory.<sup>[12]</sup>

However, a descriptive cross-sectional study conducted among 58 pediatricians in Goa to assess the knowledge, attitude, and practice of ROP showed that all the participants were aware of ROP and most common risk factors, 87.93% were aware of the timing of first screening for ROP, and 77.58% had knowledge about treatment modalities.<sup>[13]</sup>

From these study findings, it becomes evident that not only nurses but pediatricians and ophthalmologists need to be prepared to handle the surge of ROP. Nurses should also be involved in developing NICU protocols for the screening and management of ROP.

This study had some limitations such as a small sample size and being single centered, which limit its generalizability. The present study lacks control group as there are limited number of nurses working in the NICU. The authors believe that the present study finding can be an initial step for future interventional studies and recommend true experimental study for better generalization of the findings.

## Conclusion

To reduce the incidence of ROP, wider movements are needed to develop educational and core training programs for neonatal nurses. They must keep themselves updated with current advancements in preterm care. Professional organizations such as Trained Nurses' Association of India (TNAI) can also take steps to educate the nurses regarding this emerging problem. The present study concluded that developmentally supportive education program is effective in enhancing the knowledge of nurses,

and ROP should be given due importance in regular in-service education.

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## Conflicts of interest

Nothing to declare.

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