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ORIGINAL RESEARCH

Retinopathy of Prematurity as Multidisciplinary Approach, a Pediatricians Standpoint, and Practice

Hani B Albalawi[1], Faris Hashem[1], Amal Nafea J Alharbi[2], Naif M Alali[1], Wejdan Mohammed S Alshehri[2], Abdulrahman Arshed N Alharfy[2], Abdulmajeed Mousa M Alzahrani[2], Nouf Mohammed A Albalawi[2], Moustafa S Magliyah[3], Saad H Alenezi[4]

[1]Department of Ophthalmology, Faculty of Medicine, University of Tabuk, Tabuk, Saudi Arabia; [2]Faculty of Medicine, University of Tabuk, Tabuk, Saudi Arabia; [3]Department of Ophthalmology, Prince Mohammed Medical City, Aljouf, Saudi Arabia; [4]Department of Ophthalmology, College of Medicine, Majmaah University, Almajmaah, Saudi Arabia

Correspondence: Hani B Albalawi, Department of Ophthalmology, Faculty of Medicine, University of Tabuk, Tabuk, 71491, Saudi Arabia, Email hb.albalawi@ut.edu.sa

Purpose: This study aims to measure the knowledge levels toward retinopathy of prematurity (ROP) among pediatricians covering neonatal intensive care units (NICUs) in the major hospitals in Tabuk, Saudi Arabia. To our knowledge, this is the first report to assess the awareness level of ROP in the NICU pediatricians in the region.

Patients and Methods: This is a quantitative, non-experimental, cross-sectional, descriptive study using self-administered electronic questionnaires to assess the knowledge level among NICU pediatricians at the main hospitals of Tabuk city. We used a self-administer online validated knowledge, attitude, and practice (KAP) questionnaire. A scoring system was implemented in the data analysis, depending on the correct chosen answers on the KAP questionnaire, to present the ROP knowledge level in the participants.

Results: The study included 41 NICU pediatricians. Most of the participants' age exceeded 40 years (51.2%). The majority were recruited from either King Salman Military hospital (34.1%) or King Khalid hospital (31.7%). The average frequency of preterm infants seen per month exceeded 15 infants among 41.4% of the respondents. Most pediatricians recognized the important treatment modalities available for ROP (92.7%); however, only 24.4% of them could recognize that 32 weeks or less is the gestational age of the screening criteria for ROP. The overall knowledge score ranged between 4 and 10, out of a possible maximum of 12 with a mean ± SD of (6.68±1.47). The majority (75.6%) believe that the ROP treatment can successfully prevent blindness.

Conclusion: Our study demonstrated that the NICU pediatricians have good knowledge about the treatment modalities of ROP. However, their knowledge about the inclusion criteria of ROP screening was insufficient. Thus, we highlighted the necessity of raising the awareness level and the strict application of the clinical guidelines among NICU pediatricians and healthcare workers involved in managing ROP.

Keywords: retinopathy of prematurity, pediatricians, preventable, preterm infant, knowledge, attitude, practice, ROP

Introduction

Retinopathy of prematurity (ROP) is a disease that affects the blood vessels development in the retina of preterm infants with low birth weight. It is considered the second leading cause of blindness in children in the United States. ROP primarily affects preterm infants born at or before 32 weeks with 1500 g or less birth weight. In full-term infants, the retina and its vessels are fully developed; hence, ROP can only affect preterm infants.[1]

It is estimated that around 14,000 preterm infants are diagnosed with ROP in the United States yearly.[2] In Saudi Arabia, a study in Riyadh found that 38.6% of preterm infants were diagnosed with ROP.[3] A different survey from Jeddah estimated that 33.7% of preterm infants were affected with ROP.[4] A similar percentage of infants diagnosed with ROP (33.3%) was reported in a study from Tabuk.[5]

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The major risk factors are gestational age and birth weight. Additionally, using supplemental oxygen in preterm infants, respiratory distress, and blood transfusion are considered common risk factors of ROP. The extension of the temporal avascular area of the retina should also be considered in the ROP screening of newborns.[2,6–8]

Screening preterm infants in the neonatal intensive care unit (NICU) after birth is crucial for ROP prognosis. Therefore, screening guidelines have been implemented to ensure a better outcome for those infants. In the United States, the American Academy of Pediatrics, the American Association for Pediatric Ophthalmology and Strabismus, and the American Academy of Ophthalmology recommend that all infants with a birth weight of 1500 g or less, or a gestational age of 30 weeks or less should be screened for ROP.[9] The British Association for Perinatal Medicine and the College of Ophthalmologists rely on the same aforementioned criteria for ROP screening.[10] In Saudi Arabia, the screening guidelines for ROP are a birth weight of 1500g or less, and/or gestational age of 32 weeks or less, preterm infants (≤36 weeks) receiving supplemental oxygen for 50 days or more, or those who receive frequent blood or exchange transfusions.[6]

Retinopathy of prematurity is mainly treated with pan-retinal laser photocoagulation or using a combination of laser and intravitreal anti-VEGF agents.[11–14]

ROP is considered a preventable cause of blindness among children. The huge enhancement in NICU and prenatal care standards has resulted in a better survival rate among premature infants. However, the rate of ROP detection among premature infants has also increased within the last decades.[15] Since pediatricians working in the NICU are the first physicians to examine preterm infants, assessing their knowledge regarding ROP is crucial. A descriptive study measuring the level of awareness about ROP among pediatricians in Palestine assessed 70 pediatricians. They found that 15.7% of pediatricians believed ROP is not preventable, while 12.9% did not know what the affected part of the eye by the ROP is; 41.4%of the participants did not know the proper time of ROP screening.[7] A different study in India measured the level of knowledge in 83 pediatricians about ROP; the result shows that 65.1% of the respondents have good awareness about ROP; 39.8% believed that ROP is preventable; 45.8% did not know what the appropriate time to start ROP screening is. About half of them (51.8%) agreed on the ability to treat ROP.[16] In 2013, a study was conducted in Nigeria to assess the awareness levels among pediatricians' screening approaches. It revealed that despite having awareness among most participants, they had inadequate knowledge about the management and screening of ROP.[17]

Regarding the pediatricians' attitude and practice towards ROP, a study in India was done to assess the dominant practices for screening and referral strategy for ROP; the study concluded that the international recommendations for ROP referral were followed by only 14.5% of respondents and highlighted the fact of non-availability of experienced ophthalmologists as well as incompatible screening guidelines.[18]

The previous studies indicated that the awareness level among pediatricians about ROP was not adequate, and there is a necessity to raise awareness about this preventable disease to protect infants from blindness.

Our study aims to assess the awareness level and attitude toward retinopathy of prematurity among pediatricians covering NICU in Tabuk city, Saudi Arabia. To our knowledge, this report will be the first to measure the knowledge and awareness level about ROP among NICU pediatricians in the region.

Materials and Methods

The present study is a quantitative, non-experimental, cross-sectional, descriptive study using self-administered electronic questionnaires.

Approval was obtained from the ethical committee of the Faculty of Medicine, University of Tabuk, Saudi Arabia. The approval number is (READ0120).

The targeted population is the pediatricians who work in the neonatal intensive care units (NICUs) of the governmental hospitals in Tabuk city, Saudi Arabia. We visited each of the four governmental hospitals in the city (King Salman Armed Forces Hospital, King Fahad Specialist Hospital, King Khaled Hospital, and Maternity and Children Hospital). We had a meeting with the pediatricians who cover the NICU. We explained the study objectives, the questionnaire parts, and the distribution method. All the pediatricians gave initial consent on participation and provided their contact information to be added to the list of participants.

With a few modifications, the questionnaire was obtained from previously published research with similar aims.[7,16,17] It was electronically created using Google Forms and distributed to the participants as an electronic web page link sent as a text message to the participants' phone numbers. We used a self-administer online validated knowledge, attitude, and practice (KAP) questionnaire, which is quoted from a previous study after taking permission from the corresponding author to preserve property rights.[19] The questionnaire starts with obtaining consent from all participants, followed by demographic and work-related questions, and then "fill in the blank" and multiple-choice questions to assess (KAP).

Collected data were presented in the form of frequency and percentage. Knowledge score was created by assigning a score of "1" for correct answers and a score of "0" for wrong, missing, or "I do not know" responses. The total score was computed by summation of scores with a maximum score of 12, based on the number of correct answers in the KAP questions of the questionnaire. The total score was tested for normality by the Shapiro–Wilk test and was abnormally distributed.[20] Data entry and analysis were performed using the Statistical Package for Social Sciences (SPSS), version 26.

Results

A total of 41 pediatricians participated in our study, including all pediatricians working in the NICUs of all governmental hospitals in Tabuk. Among the participants, the age of more than half of them (51.2%) exceeded 40 years. Females represent 56.1% of them. Regarding educational qualification, 48.8% were specialists, and 51.3% had an experience of more than ten years in clinical practice. Most were recruited from either King Salman Military hospital (34.1%) or King Khalid hospital (31.7%). The average frequency of preterm infants seen per month exceeded 15 among 41.4% of the respondents. Demographic and work-related characteristics are presented in (Table 1).

Table 1 Demographic and Work-Related Characteristics of the Participants (n=41)

	Frequency	Percentage
Age in years		
25–40	20	48.8
>40	21	51.2
Gender		
Male	18	43.9
Female	23	56.1
Educational qualification		
Resident	12	29.2
Specialist	20	48.8
Consultant	9	22.0
Experience in practice (years)		
<5	14	34.1
5–10	6	14.6
>10	21	51.3
Place of practice		
King Fahad Specialist hospital	2	4.9
King Khalid hospital	13	31.7
Child and Maternity hospital	12	29.3
King Salman Military hospital	14	34.1
The average frequency of preterm infants seen/month		
0–5	7	17.1
6–10	8	19.5
11–15	9	22.0
>15	17	41.4

Regarding the knowledge, most pediatricians recognized the important treatment modalities available for ROP, depending on the stages and zones, which may include observation, cryotherapy, laser, intravitreal injection, or surgical intervention (92.7%). The majority (90.2%) stated that the retina is the part of the eye affected by ROP, and one should initiate treatment after diagnosis of sight-threatening ROP as soon as possible, no more than 72 hours (87.8%). On the other hand, only 24.4% of them could recognize that 32 weeks or less is the gestational age of the screening criteria for ROP. Only 29.3% could name the safe dilatation drops for preterm infants, 17.1% knew that vitreous hemorrhage is among the complications of untreated ROP, and 12.2% recognized that myopia is a major possible complication of ROP treatment (Table 2).

The overall knowledge score ranged between 4 and 10, out of a possible maximum of 12 with a mean ± SD of (6.68 ±1.47) and median (IQR) of 7 (6–8). It was abnormally distributed; the p-value of the Shapiro–Wilk test was 0.043 (Figure 1).

Regarding participants' perspectives on the successfulness of ROP treatment in preventing blindness, most participants thought it was very good (75.6%).

Discussion

Retinopathy of prematurity (ROP) is an ophthalmic disease that can lead to blindness, and it affects the retina's vasculature of preterm infants.

The most common risk factors for ROP are low gestational age and birth weight. Effective screening and early detection of the disease are essential in preventing vision loss associated with this disorder.[1,2,21]

Table 2 The Responses of the Participants to the Knowledge Questions Regarding Retinopathy of Prematurity[a]

Knowledge Questions	Right Answer		
	Response	No.	%
Which birth weight do you think is the screening criteria for ROP?	1500 gram or less	30	73.2
Which gestational age do you think is the screening criteria for ROP?	32 weeks or less	10	24.4
At what age do you refer an infant with ROP to an ophthalmologist?	32 weeks postmenstrual age (PMA) or 4 weeks chronological age, whichever is later.	29	70.7
Name the safe dilatation drops for preterm infants	Phenylephrine or tropicamide	12	29.3
Which part/s of the eye is/are affected by ROP?	Retina	37	90.2
What are the important treatment modalities available for ROP?	Depend on stages and zones and may include observation, cryotherapy, laser, intravitreal injection, or surgical intervention	38	92.7
When should one initiate treatment after diagnosis of sight-threatening ROP?	It is an ocular emergency, so as soon as possible, no more than 72 h	36	87.8
Complications of untreated ROP may include	-Neovascularization of retina -Retinal detachment -Vitreous hemorrhage -Blindness	19 33 7 18	46.3 80.5 17.1 43.9
Complications of ROP treatment may include	Myopia	5	12.2

Notes: [a]To assess the knowledge level among the participants, we created a scoring system with a total of 12 points, depending on the nine knowledge questions; one point for each question, except for question #8 which has four correct options where the participants are given the option to choose more than one answer.
Abbreviations: ROP, retinopathy of prematurity; NICU, neonatal intensive care unit.

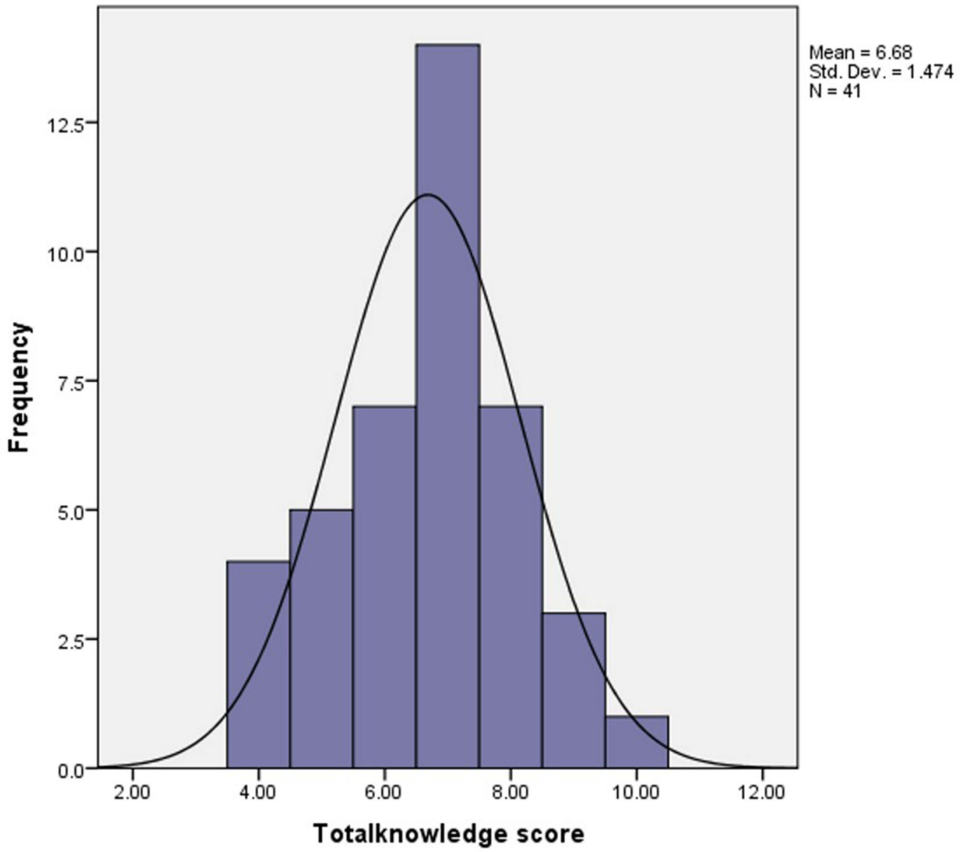

Figure 1 The overall knowledge score regarding retinopathy of prematurity among pediatricians.

Our study was performed on 41 pediatricians who represent the majority of pediatricians covering NICUs in Tabuk city. According to our results, the mean knowledge score by the participants was 6.68 out of 12 total scores. Some of the essential points in the knowledge aspect were low among most of the participants; for instance, only 24.4% of them knew the screening criteria for ROP; this criterion is fundamental in the referral of the suspected cases to the ophthalmologist, which is consistent with the results of previous studies done in other countries.[7,16,17] The screening criteria of ROP were not well known by pediatricians. Another vital piece of information was about the safe dilatation eye drops used in preterm infants, which was answered correctly by only 29.3% of respondents. On the other hand, most of the participants agreed on the good outcome of ROP treatment, and they have very good knowledge about the modalities of ROP treatment in the percentage of 92.7%. Additionally, the importance of initiating the treatment after diagnosing serious ROP cases in a short period was agreed on by 87.8% of participants.

Managing ROP is a collaborative work that requires a multidisciplinary team, where the pediatricians, who are the first-line physicians, detect ROP and refer preterm infants to the ophthalmologists who confirm the diagnosis and initiate the treatment. Also, parents of ROP patients should be knowledgeable about the disease as their role is crucial in maintaining the treatment plan. Thus measuring the awareness level about ROP is essential for all stakeholders.[6,22]

In Saudi Arabia, where the same international ROP screening guidelines are implemented, the used guideline was dominated by two programs at the Ministry of Health, which are the National Eye Health Program and Neonatology Services Improvement Program, and the guidelines have been approved by the Saudi Ophthalmological Society and Saudi Neonatology Society. They also recommend that every NICU should clearly announce the instructed protocols, including the examination and follow-up of the suspected cases of ROP based on the approved guideline. Also, they emphasize the importance of cooperation between healthcare workers in the NICU as neonatologists, nurses, and ophthalmologists for a better outcome in such a case.[6] Although there are established ROP screening guidelines,

however, the implementation of these guidelines is suboptimal; this was a consequence of the physicians' inadequate knowledge, which could generate a pitfall of denying the preterm infants adequate screening and management.[23]

The results of our study highlight the need to raise the awareness level and knowledge about ROP among the multidisciplinary team members who are collaborating in managing infants with ROP. This can be achieved by holding regular educational meetings involving ophthalmologists, pediatricians, neonatologists, obstetricians, nurses, and parents to disseminate the knowledge, share the updates on ROP screening guidelines, and discuss the obstacles that may prevent the success of the treatment plan.

Our study was limited by the self-administered nature of the responses, which could result in a misclassification bias and may affect the results. Additionally, the NICU contains a comprehensive team of different healthcare workers dealing directly with preterm infants; a potential limitation is that we only included pediatricians in our research.

Conclusion

To improve the health care and treatment outcomes of ROP, we suggest raising the ROP awareness level among pediatricians who are covering NICU by focusing on important information such as the risk factors, the screening criteria, and the treatment modalities. In addition, we recommend holding periodic educational sessions, seminars, and workshops to disseminate essential information with ROP stakeholders and NICU healthcare workers.

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Disclosure

The authors reveal there are no conflicts of interest in this work.

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