

Knowledge, Awareness and Attitudes towards Retinopathy of Prematurity among Jordanian Pediatricians: A Cross Sectional Descriptive Study

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Abstract

Background: Retinopathy of prematurity (ROP) is a preventable cause of childhood blindness. This study aims to measure knowledge, awareness and attitudes of Jordanian pediatricians towards ROP screening and treatment protocols, and to identify any barriers concerning referrals to specialized care.

Methods: This is a cross-sectional non-interventional descriptive study. A self-administered semi-structured electronic questionnaire was designed to assess the knowledge, attitude and practice patterns of responders and was disseminated via social media and direct contact with pediatricians in governmental and private hospitals from all over the country and collected between June and November of 2022. The questionnaire included questions regarding demographics, level of education, practice details and knowledge regarding ROP.

Results: A total of 85 responders from all levels completed the questionnaire. Most of the responders (78 (91.8%)) identified the main risk factors of ROP as low birth weight and gestational age and maintained that timely screening should be performed by an ophthalmologist. Fifty-nine pediatricians (69.4%) were sure that ROP is preventable and 62 (72.9%) identified both laser and anti-vascular endothelial growth factor injections as possible modalities of treatment. Thirty participants (35.3%) faced real limitations reaching ophthalmologists for a reliable ROP consultation.

Conclusions: This study demonstrated a high level of awareness of ROP among Jordanian pediatricians of all levels, although some gaps pertaining to the accurate timing of screening still exist. There are identifiable limitations facing Jordanian pediatricians to reach a reliable ophthalmic service to screen and manage referred cases. A unified nation-wide ROP screening protocol with clear access to standardized ophthalmic care is necessary to reduce the challenges facing the screening and management process and by extension, the burden of this preventable disease.

Keywords: Retinopathy of prematurity, knowledge, awareness, pediatricians.

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1. INTRODUCTION

Retinopathy of prematurity (ROP) is a disease that affects blood vessel development in the retina of preterm infants with low birth weight [1]. It is a retinal vascular disorder

characterized by defective vasculogenesis and is the second leading cause of blindness in children in the United States [2]. ROP primarily affects preterm infants born at or before 32 weeks with 1500g or less birth weight. If detected early and treated properly, ROP is a preventable cause of childhood blindness [3]. Screening and treatment guidelines for ROP have evolved over time, and have classically

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included ablating the avascular retina with cryotherapy and/or laser photocoagulation [4]. Optimizing prenatal and perinatal care, improving diagnostic screening protocols, and the inclusion of anti-vascular endothelial growth factor (VEGF) agents to support the neural and vascular development of the premature infant retina have all emerged as the new set of goals in ROP management [5,6].

In the United States, it is estimated that around 14,000 preterm infants are diagnosed with ROP every year [7]. ROP incidence has increased as a result of the advancements in neonatal and perinatal care, which improved the survival of low birth weight and premature babies [8-10]. Developing nations in the Middle East have been catching up with ROP incidence, with reports citing numbers between 28-44% of screened infants [11, 12]. A report from Jordan highlighted the fact that ROP screening protocols adopted in the West may not be exactly suitable for Middle Eastern infants as a unique set of locale-specific risk factors may come into play; one prime example is how pediatricians perceive this disease [13].

Pediatricians remain at the heart and soul of this treatable blinding disease, as the onus of requesting a screening ophthalmic exam lies with the infant's primary care provider. Reports from developing countries probing the levels of knowledge towards ROP screening and treatment reflect generally poor to moderate levels of awareness among pediatricians [14, 15]. This study aims to measure the level of knowledge, awareness and the attitudes of Jordanian pediatricians towards ROP screening and treatment protocols, and to identify any barriers facing the referral process.

2. MATERIALS AND METHODS

This is a cross-sectional, non-interventional descriptive study aimed at recruiting pediatricians of all levels in Jordan. This research was approved by the Institutional

Review Board at Jordan University Hospital (approval # 10/2021/29488). A self-administered semi-structured electronic questionnaire was designed to assess the knowledge, attitude, and practice patterns of responders and was disseminated via social media and direct contact with paediatricians in governmental and private hospitals from all over the country and collected between June and November of 2022. The questionnaire included questions regarding demographics, level of education, practice details, knowledge regarding ROP (incidence, risk factors, screening protocols, treatment modalities, prognosis, and limitations reaching ophthalmologists). Participants' anonymity was maintained throughout the process.

Knowledge, awareness and attitudes towards ROP among Jordanian paediatricians' data were extracted and recorded onto an Excel spreadsheet. The Statistical Package for Social Sciences SPSS version 21.0 (Chicago, USA), was used for analysis. The chi square test was utilized to analyse if there is any significant difference between specialists, senior residents and junior residents. We adopted a p-value of 0.05 as a significant threshold.

3. RESULTS

A total of 85 responders completed the questionnaire; of which 37 were male (43.5%) and 48 were female (56.5%). The study included 34 specialists (40.0%), 19 senior residents (PGY3 or PGY4) (22.4%) and 32 junior residents (PGY1 or PGY2) (37.6%). Among specialists; 16 were board- certified for more than 15 years (47.0%), 7 were board-certified for less than 5 years (20.6%), 11 were board- certified for 5-15 years (32.4%). Most of the participants worked in central Jordan 56 (65.9%), while 24 worked in Northern Jordan (28.2%) and only 5 in Southern Jordan (5.9%). Table 1 summarizes the demographic characteristics of the participants in this study.

Table: 1: Demographic details of study participants

Variable	Category	Frequency	Percentage
Gender	Male	37	43.3%
	Female	48	56.5%
Educational qualification	Specialist	34	40.0%
	Senior resident	19	22.4%
	Junior resident	32	37.6%
Years of experience	0-5 years	7	20.6%
	5-15 years	11	32.4%
	More than 15 years	16	47.0%
Region	North	24	28.2%
	Center	56	65.9%
	South	5	5.9%

Eighty-four participants (98.8%) thought that prematurity affects the retina and only one thought it doesn't (1.2%). Most of the participants, 78 (91.8%) maintained that low birth weight (less than 1.5kg) and gestational age less than 34-35 weeks are the main risk factors for ROP.

Twenty-one pediatricians (24.7%) thought the usual percentage of the ROP among premature babies is 20%, fifteen (17.6%) thought it is 10%, eleven (12.9%) thought it is 40%, four (4.7%) thought it is 60% and three (3.5%) thought it is 75%.

Most of the responders (78 (91.8%)) believed that the ROP screening should be performed by the ophthalmologist, while 6 participants (7.1%) believed it should be performed by the pediatrician. Regarding the examination/screening tool, twenty-two (25.9%) were sure that the direct ophthalmoscope is used as the examination device, eight (9.4%) were sure that it is the indirect ophthalmoscope and twenty-two (25.9%) believed that the retinal camera is the gold standard for screening for ROP. Two pediatricians were not sure about the screening tool (2.4%). Forty-eight answered that the ideal

timing to start ROP screening depends on the gestational age at birth (56.5%), thirty answered it's between 4-6 weeks (35.3%), four answered that it is due once the neonate is discharged (4.7%) and three had no idea (3.5%).

Among the participants, 59 were sure that ROP is preventable (69.4%), 20 were sure that it is not (23.5%) and 6 did not know (7.1%). Eighty (94.1%) answered that ROP is treatable, while only one answered that it is not (1.2%), and four did not know (4.7%).

Regarding the treatment modalities; sixty-two believed that both laser photocoagulation and intravitreal anti-VEGF drugs can be used for treatment depending on the case (72.9%), while thirteen believed that only laser photocoagulation is the treatment (15.3%), only one believed that intravitreal anti-VEGF drugs are the only treatment (1.2%) and nine did not know (10.6%).

Regarding the prognosis, 79 participants answered that the prognosis varies depending on early detection, frequent follow up and interventions (92.9%), while 5 answered that ROP carries a good prognosis (5.9%) and only one participant didn't know (1.2%). Table 2 summarizes the participants' findings.

Table 2 knowledge and attitudes of participants regarding ROP.

Category	Frequency	Percent
Effect of prematurity on retina		
-Yes	84	98.8%
-No	1	1.2%
Risk factors for ROP		
-Gestational age <34-35 weeks	3	3.5%
-Weight less than 1500g	3	3.5%
-All of the above	78	91.8%
-Do not know	1	1.2%
Percentage of ROP among premature babies		
-10%	15	17.6%
-20%	21	24.7%
-40%	11	12.9%
-60%	4	4.7%
-75%	3	3.5%
-No response	31	36.5%
When to screen for ROP		
-4-6 weeks	30	35.3%
-Depends on gestational age	48	56.5%
-On discharge	4	4.7%
-I do not know	3	3.5%
Who performs screening		
-An ophthalmologist	78	91.8%
-A pediatrician	6	7.1%
-I do not know	1	1.2%
Screening device used		
-Direct ophthalmoscope	22	25.9%
-Indirect ophthalmoscope	8	9.4%
-Retinal camera	22	25.9%
-I do not know	2	2.4%
The condition is preventable		
-Yes	59	69.4%
-No	20	23.5%
Condition is treatable		
-Yes	80	94.1%
-No	1	1.2%
Treatment modalities		
-Laser photocoagulation	13	15.3%
-Intravitreal anti-VEGF	1	1.2%
-Both can be used depending on case	62	72.9%
-I do not know	9	10.6%
Prognosis of ROP		
-Good	5	5.9%
-Varies depending on early detection and intervention	79	92.9%
- I do no know	1	1.2%

Seventy-nine participants (92.9%) responded that they will consult the ophthalmology department themselves if they have a premature baby in their NICU, while one participant will inform the family to do the consult (1.2%), three will advise the family to visit an ophthalmology clinic after discharge (3.5%) and two had no idea what to do (2.4%).

Thirty participants faced limitations reaching ophthalmologists (35.3%), and fifty-five did not (64.7%). Among those who faced limitations, 17 participants worked at hospitals that have no experienced paediatric ophthalmologist (56.7%), 9 worked at hospitals that have no ophthalmology department (30.0%), and 4 participants worked at hospitals with an ophthalmology department but described difficulties contacting them (13.3%). For all studied categories, we found no statistically significant difference between specialists, senior residents, and junior residents ($P>0.05$ for all study questions).

4. DISCUSSION

This study aims to assess the knowledge, awareness and attitudes of Jordanian paediatricians towards ROP and to decide if certain limitations hinder timely ophthalmic evaluation when requested by the infant's caregivers. ROP remains a cause of high financial and social burden for the individual and community, as it may lead to permanent visual disability especially if it is not detected early and treated promptly. Screening guidelines have been suggested by the American Academy of Pediatrics: all infants with a birth weight of ≤ 1500 g or a gestational age of 30 weeks or less (as defined by the attending neonatologist) and selected infants with a birth weight between 1500 and 2000g or a gestational age of >30 weeks who are believed by their attending pediatrician or neonatologist to be at risk for ROP (such as infants with hypotension requiring inotropic support, infants who received oxygen supplementation for more than a few days, or infants who received oxygen without saturation monitoring) should be screened for ROP [16]. The recent UK screening of retinopathy of prematurity

guideline include all infants less than 31 weeks of gestational age (up to and including 30 weeks and 6 days) or less than 1501g birth weight, should be examined to screen for the presence of ROP (one criterion to be met for inclusion) [17]. Hence, screening and treatment protocols have been established in some countries to enhance early detection and management.

ROP incidence increases in developing countries due to a lack of qualified neonatologists, a lack of adoption of effective screening guidelines and policies as well as excess oxygen exposure due to lack or poor oxygen saturation measuring techniques. All of these causes made ROP a main cause of avoidable blindness in children, surpassing infectious causes. In Jordan, a study by Gharaibeh et al., which included 91 preterm infants found that ROP occurred in 28.6% of all patients, and interestingly, in 20% of infants with birth weight greater than 1500g and in 9.4% of preterm infants with gestational age ≥ 32 weeks [13]. The study concluded that ROP occurs in premature infants in Jordan with gestational age above 32 weeks and birth weight above 1250 gm, and that future guidelines for screening should incorporate region-specific factors. Notably, rates of low birth deliveries and prematurity in Jordan were reported as high as 8.3% and 7%, respectively [18].

Many studies were conducted around the world to assess the knowledge of pediatricians toward ROP, with varying results, but up to our knowledge, this is the first study to tackle this topic in Jordan. This study demonstrated that although Jordanian pediatricians displayed good general knowledge about ROP, there is a discrepancy regarding the knowledge about timing of ROP screening; this could be due to the lack of set screening protocols for this condition. 91.8% of the participants were aware about the risk factors of ROP, compared to 57.8% in neighbouring Palestine [14]. In our study, 91.8% of participants thought that the main risk factor is low gestational age. Uhumwangho et al asked the same question to Nigerian pediatricians: 83.3% of participants thought that the main risk factor is high oxygen

exposure [15].

In our study, 69.4% of participants were sure that ROP is preventable compared to 80% in Saudi Arabia and 39.8% in South India [19, 20]. Regarding the treatment modalities, 72.9% of the participants in our study were aware that the treatment modality could be laser photocoagulation or anti-VEGF according to the case. According to Sathiamohanraj et al, 33.7% of participants in South India thought that laser is the only treating modality while 37.5% of the participants from the Nigerian study thought that laser or cryotherapy could be the modality of treatment [15, 20].

One suggested simple communication plan for ROP screening in Jordan is for the pediatric department to send a weekly ROP list including the details of premature babies who meet the criteria of screening assigned to the in-charge consultant for that particular week [13]. In spite of this, screening limitations do persist with more than one third of Jordanian pediatricians (35%) reporting obstacles. The most important limiting factor appears to be the lack of ophthalmologists experienced in ROP screening and management at their designated hospitals. This highlights the need for improving the skills of available ophthalmologist in ROP examination protocols. This finding resonated with the aforementioned reports from third world countries, where the referral process remains far from standardized [14,15,19,20].

This study has limitations inherent to its design. The collected data could not be validated as practices were not observed. In addition, other primary health care providers, namely neonatal intensive care unit nurses, were not included. The role of the nursing staff in the prevention of ROP cannot be overstated,

as they help in monitoring oxygen saturation targets during the whole period of treatment. They are responsible for feeding and temperature control and play a vitally important role in preventing late sepsis [20].

5. CONCLUSION

ROP is a preventable cause of blindness. Effective treatment depends on early detection, which can't be achieved without timely screening. This requires a high level of awareness of ROP among pediatricians and active communication and cooperation with ophthalmologists. This study demonstrated a high level of awareness of ROP among Jordanian pediatricians in terms of knowledge, the need for screening, the screening procedure, treatment modalities and their effectiveness relative to similar studies from comparable third world countries. There is, however, some gaps pertaining to the accurate timing of screening, and most importantly, a warning regarding access to expert ROP ophthalmic care. There is a dire need for a unified nation-wide screening protocol for ROP with clear access to standardized ophthalmic care. This entails training pediatricians to identify and refer neonates at risk, and empowering practicing ophthalmologists to tackle ROP cases confidently, thereby overcoming the hiccups in the referral- screening- treatment chain.

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7. DISCLOSURE STATEMENTS

Financial disclosure statement: All authors report no actual or potential interests pertaining to this study.

REFERENCES

1. Sommer A, Taylor HR, Ravilla TD, West S, Lietman TM, Keenan JD, Chiang MF, Robin AL, Mills RP; Council of the American Ophthalmological Society. Challenges of ophthalmic care in the developing world. *JAMA Ophthalmol.* 2014 May;132(5):640-4.
2. Bashinsky AL. Retinopathy of Prematurity. *N C Med J.* 2017 Mar-Apr;78(2):124-128.
3. Blencowe H, Lawn JE, Vazquez T, Fielder A, Gilbert C. Preterm-associated visual impairment and estimates of retinopathy of prematurity at regional and global levels for 2010. *Pediatr Res.* 2013 Dec;74 Suppl 1(Suppl 1):35-49.
4. Hartnett ME. Advances in understanding and management of retinopathy of prematurity. *Surv Ophthalmol.* 2017 May-Jun;62(3):257-276.
5. Hartnett ME. Retinopathy of Prematurity: Evolving Treatment With Anti-Vascular Endothelial Growth Factor. *Am J Ophthalmol.* 2020 Oct; 218:208-213.
6. Mutlu FM, Sarici SU. Treatment of retinopathy of prematurity: a review of conventional and promising new therapeutic options. *Int J Ophthalmol.* 2013;6(2):228.
7. Good WV. Retinopathy of prematurity incidence in children. *Ophthalmology.* 2020 Apr;127(4S): S82-S83. doi: 10.1016/j.ophtha.2019.11.026.
8. Wheatley CM, Dickinson JL, Mackey DA, et al. Retinopathy of prematurity: recent advances in our understanding. *Archives of Disease in Childhood-Fetal and Neonatal Edition* 2002;87: F78-F82.
9. Kim TI, Sohn J, Pi SY, Yoon YH. Postnatal risk factors of retinopathy of prematurity. *Paediatr Perinat Epidemiol.* 2004 Mar;18(2):130-4.
10. Akkoyun I, Oto S, Yilmaz G, Gurakan B, Tarcan A, Anuk D, Akgun S, Akova YA. Risk factors in the development of mild and severe retinopathy of prematurity. *J AAPOS.* 2006 Oct;10(5):449-53.
11. Al-Bdour MD, Al-Till MI, Bin-Tarif RM, Shamayleh AK. Evaluation of risk factors for retinopathy of prematurity at Jordan University Hospital. *Middle East J Ophthalmol.* 2004; 2:108-11.
12. Abdel HA, Mohamed GB, Othman MF. Retinopathy of Prematurity: A Study of Incidence and Risk Factors in NICU of Al-Minya University Hospital in Egypt. *J Clin Neonatol.* 2012 Apr;1(2):76-81.
13. Gharaibeh A, Khassawneh M, Khriesat W, Alkhatib S, Migdadi Y. Adopting Western Retinopathy of Prematurity Screening Programs in Eastern Countries, are we Screening Properly? *Middle East Afr J Ophthalmol.* 2011;18(3):209-213.
14. Akkawi MT, Qaddumi JAS, Issa HRM, Yaseen LJK. Awareness of retinopathy of prematurity among pediatricians in West Bank, Palestine: a descriptive study. *BMC Ophthalmol.* 2018 Aug 13;18(1):195.
15. Uhumwangho O, Israel-Aina Y. Awareness and screening for retinopathy of prematurity among paediatricians in Nigeria. *J West Afr Coll Surg.* 2013;3(3):33-45.
16. Fierson WM; AMERICAN ACADEMY OF PEDIATRICS Section on Ophthalmology; AMERICAN ACADEMY OF OPHTHALMOLOGY; AMERICAN ASSOCIATION FOR PEDIATRIC OPHTHALMOLOGY AND STRABISMUS; AMERICAN ASSOCIATION OF CERTIFIED ORTHOPTISTS. Screening Examination of Premature Infants for Retinopathy of Prematurity. *Pediatrics.* 2018 Dec;142(6): e20183061.
17. Royal College of Paediatrics and Child Health. UK screening of retinopathy of Prematurity guideline: Summary of recommendations, March 2022.
18. Khader YS, Batieha A, Al-Njadat RA, Hijazi SS. Preeclampsia in Jordan: incidence, risk factors, and its associated maternal and neonatal outcomes. *J Matern Fetal Neonatal Med.* 2018 Mar;31(6):770-776.
19. Abdul-Aziz Al Hadlaq, Abdulrahman AL-Muqbil,

- Ali Al-Ali, Ibrahim Al-Rashidi, Zafar Iqbal. Knowledge, attitude, and practice study about retinopathy of prematurity among pediatricians in Al-Qassim region, Saudi Arabia. *International journal of Medicine in Developing Countries*. 2021;5(6):1290–1295.
20. S R Sathiamohanraj, Parag K Shah, D Senthilkumar, V Narendran, N Kalpana. Awareness of retinopathy of prematurity among pediatricians in a tier two city of South India. *Oman J Ophthalmol*. 2011 May;4(2):77-80
21. Kalyan G, Moxon S. The Role of Neonatal Nurses in the Prevention of Retinopathy of Prematurity. *Indian Pediatr*. 2016 Nov 7;53 Suppl 2: S143-S150.

معرفة ووعي و مواقف أطباء الأطفال في الأردن تجاه إعتلال الشبكية الخداجي: دراسة مقطعية وصفية

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الملخص

خلفية البحث: يعتبر اعتلال الشبكية الخداجي أحد أسباب فقدان البصر التي يمكن الوقاية منها في الأطفال الخدج. تهدف هذه الدراسة لقياس معرفة ووعي و مواقف أطباء الأطفال الأردنيين تجاه هذا الاعتلال و اجراءاته المسحية و العلاجية و التعرف على أي معوقات قد تعتري تحويل الحالات للعناية المتخصصة.

منهجية البحث: هذه دراسة مسحية لاتداخلية تم إجراؤها بتوزيع استبانة الكترونية تهدف لقياس معرفة ووعي و مواقف أطباء الأطفال من مستشفيات في القطاعين العام و الخاص في الأردن بين حزيران و تشرين ثان من عام 2022. تضمنت الاستبانة أسئلة تتعلق بالتركيبة السكانية و التحصيل العلمي و تفاصيل العناية الطبية المتعلقة باعتلال الشبكية الخداجي.

نتائج البحث: أكمل الدراسة خمسة و ثمانون مشاركا. استطاع غالبية المستجيبين (78) معرفة عوامل الاختطار الرئيسية لاعتلال الشبكية الخداجي و هي وزن المولود القليل و عمر الحمل، كما أجابوا بضرورة إجراء فحص مسحي للطفل من قبل طبيب العيون. تسع و خمسون طبيبا أجابوا بأن اعتلال الشبكية الخداجي يمكن الوقاية منه و اثنان و ستون كانوا متأكدين أن العلاج بالليزر أو بحقن مضاد عامل نمو بطانة الأوعية الدموية هي خيارات العلاج الأساسية. ثلاثون مشاركا أقرروا بوجود عوائق للوصول لخدمة متخصصة في طب و جراحة العيون.

الاستنتاجات: تبين هذه الدراسة درجة عالية من الوعي باعتلال الشبكية الخداجي لدى أطباء الأطفال من مختلف الدرجات في الأردن، رغم وجود بعض الثغرات فيما يتعلق بتوقيت الفحص المسحي. هناك معوقات واضحة تواجه أطباء الأطفال للوصول لخدمة مسحية و علاجية موثوق بها في طب و جراحة العيون. توصي الدراسة بتبني بروتوكول وطني موحد لاعتلال الشبكية الخداجي لمواجهة التحديات التي تتعلق بالتعامل مع هذا الاعتلال و آثاره على حاسة الإبصار لدى الأطفال الخدج.

الكلمات الدالة:اعتلال الشبكية الخداجي، علم، معرفة، أطباء الأطفال.