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Retinopathy of Prematurity: An Ophthalmic Concern in Albanian Neonatal Care – Insights and National Perspective

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Abstract

Retinopathy of Prematurity (ROP) is a significant preventable cause of childhood blindness worldwide, especially among premature infants who require care in neonatal intensive care units especially under oxygen therapy.In Albania, as neonatal services have evolved, more preterm infants survive, leading to a corresponding increase in the incidence of retinopathy of prematurity.Despite the growing incidence, there is still no national data that reflect the real situation of this problem in Albania.

The primary goal of this review is to provide a comprehensive and accessible overview of Retinopathy of Prematurity (ROP), including its pathogenesis, risk factors, classification, current screening and treatment approaches, and long-term consequences for affected children. Beyond summarizing the international evidence, we aim to draw attention to the lack of national data and published evidence regarding ROP in Albania and highlight the initiation of the country's first national observational study on ROP, supported by the National Agency of Science and Innovation (NASRI).This initiative is expected to generate local evidence and inform future strategies.

Finally, this review calls the urgent development of national protocols and the establishment of a more coordinated system of care to effectively prevent blindness from ROP in Albania.

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INTRODUCTION

Retinopathy of Prematurity (ROP) is a disorder that affects the development of blood vessels in the retina of premature infants. It occurs when normal vascular growth is disrupted often due to exposure to high levels of oxygen or oxidative stress during neonatal care. If not identified and treated in time, ROP can progress to retinal detachment and lead to permanent blindness (1).

As neonatal care continues to improve around the world, more premature infants are surviving especially in middle-income countries leading to a growing number of babies at risk for ROP (1).

In Albania, the survival of preterm infants has improved considerably over recent years, reflecting advances in neonatal care (2). While this is an important achievement, it also brings new challenges: more infants are now at risk for retinopathy of prematurity (ROP), a preventable cause of childhood blindness (3,4). Globally, improved survival of extremely preterm babies has been accompanied by a rise in ROP cases (5). Nationally, data on ROP in Albania remain limited. Existing vision screening programs show that preterm infants are among the primary groups evaluated for ROP, usually by ophthalmologists in maternity or eye clinics (4). However, the lack of standardized national protocols means that screening and treatment practices can vary widely between regionscreating inequities in care(6,7).

These circumstances highlight the need for comprehensive national guidelines. Developing structured screening programs, training healthcare personnel, and ensuring timely access to treatment are essential steps to prevent avoidable blindness and improve outcomes for Albania's most vulnerable newborns (2–7).

Thisanalyses brings together current understanding of ROP and places it within the context of Albania's healthcare landscape. By doing so, it aims to support the development of organized screening efforts, promote early diagnosis, and guide timely interventions that can safeguard vision and quality of life for at risk infants.

METHODS

This article was conducted as a narrative review of the literature on retinopathy of prematurity (ROP). A targeted literature search was performed in PubMed, Scopus, and Google Scholar covering publications up to June 2025. Search terms included combinations of "retinopathy of prematurity," "ROP guidelines," "ROP screening," "ROP treatment," "ROP risk factors," and "ROP epidemiology."

We prioritized internationally recognized guidelines, landmark clinical trials, systematic reviews and meta-analyses, and large multicenter or nationalstudies that reported on incidence, risk factors, classification, screening protocols, treatment approaches, and outcomes. Regional publications from Eastern and Southeastern Europe were included when relevant to healthcare contexts comparable to Albania. Articles limited to single case reports, small case

series, or opinion pieces without primary data were excluded.

Global and Regional Epidemiology

A recent 2024 meta-analysis that pooled data from 139 studies and over 120,000 preterm infants estimated that nearly one in three babies screened globally (about 31.9%) are affected by Retinopathy of Prematurity. Among them, around 7.5% develop severe forms of the disease that can threaten their vision. The risk is especially high among the most vulnerable group: infants born at or before 28 weeks of gestation (8).

Interestingly, the impact of ROP varies depending on a country's income level. In high-income countries, where neonatal care has advanced considerably, more extremely premature infants survive but this also means a higher number of babies at risk of developing severe ROP. In contrast, low- and middle-income countries often face challenges such as missed diagnoses or limited access to treatment, making it harder to manage the condition effectively and prevent blindness (9).

Regional Comparisons

In Turkey, ROP is reported in about 30% of screened preterm infants, with 5% requiring treatment. Importantly, screening criteria were later expanded after it became clear that treatable ROP can also develop in larger and more mature preterm infants (10). Similarly, in Bulgaria, ROP was identified in 22.8% of preterm babies, with 110 out of 1,490 infants requiring intervention (11).

Across Eastern Europe, reported incidence rates vary significantly from as low as 3% in high-resource centers in the United Kingdom to about 20% in more resource-limited healthcare systems (12).

Given Albania's classification as a middle-income country and its comparable trajectory in neonatal care development, a similar burden of ROP is likely. However, in the absence of national screening data or published reports, the true scope of the problem remains largely unknown.

Pathophysiology and Risk Factors

The growth of retinal blood vessels in a developing fetus begins at the optic disc and slowly extends outward toward the edges of the retina, usually completing around 40 weeks of gestation (13). In babies born too early, this natural process is abruptly halted. Their underdeveloped eyes are suddenly exposed to an external environment often involving high oxygen levels or oxidative stress that can interfere with normal vessel growth. This disruption puts preterm infants at significant risk for developing Retinopathy of Prematurity (ROP) (14).

The development of ROP happens in two overlapping stages (5).

In the first stage, when premature babies receive high levels of oxygen often through supplemental oxygen therapy, it actually slows down the

production of vascular endothelial growth factor (VEGF), which is needed for normal blood vessel growth. Because of this, the normal development of retinal vessels is interrupted or stops altogether.

In the second stage, as the retina starts to experience low oxygen levels, the body reacts by producing too much VEGF. This causes new, abnormal blood vessels to grow in the eye. These fragile vessels can easily leak or cause scarring, which, if not treated, may result in the retinal detachment, a serious condition that can lead to vision loss.

Several factors can increase a baby's risk of developing ROP. The most important ones are being born very early (before 32 weeks of gestation) and having a low birth weightespecially under 1,500 grams, with the highest risk in those weighing less than 1,000 grams. Other contributing factors include receiving unregulated or long-term supplemental oxygen, needing mechanical ventilation, and facing complications related to prematurity like infections (sepsis), brain bleeding (intraventricular hemorrhage), and lung problems (bronchopulmonary dysplasia). Maternal health issues such as preeclampsia, as well as challenges after birth like apnea, blood transfusions, and poor weight gain, have also been linked to a greater risk of ROP (15).

Recognizing these risk factors is crucial for healthcare providers to identify which infantsrequire early eye exams and careful follow-upto prevent vision-threatening disease.

Classification and Staging (ICROP-3, ETROP)

The International Classification of ROP (ICROP-3) classifies disease by (16):

- Zone I–III (location in retina)
- Stage 1–5 (severity)
- Plus disease (active disease indicated by vessel dilation/tortuosity)
- Aggressive Posterior ROP (AP-ROP) is a rapidly progressing subtype often requiring urgent treatment.

The Early Treatment for ROP (ETROP) study further stratifies cases into (17):

- Type 1: High-risk prethreshold ROP (requires treatment)
- Type 2: Lower-risk (requires observation)

Screening Guidelines and Follow-up

International guidelines usually recommend screening babies born at or before 30 to 32 weeks of gestation, or those weighing 1,500 grams or less. However, in middle-income countries, the screening criteria are often broader, including babies born up to 34 weeks, weighing up to 2,000 grams, or those who are clinically unstable to make sure no cases are missed (18).

The first eye exam is typically done between 4 to 6 weeks after birth or when the baby reaches a corrected age of 31 to 32 weeks, whichever comes later. Follow-up exams are scheduled every 1 to 3 weeks depending on the area of the retina affected and how the condition is progressing (19).

Screening usually ends once the retinal blood vessels have fully grown out to the outer zone (zone III), or by around 45 weeks' postmenstrual age if the infant shows no signs of worsening ROP or if the disease has regressed (20,21).

Treatment Modalities

The choice of treatment for ROP depends on how severe the disease is, with intervention mainly needed for the high-risk Type 1 cases, according to ETROP guidelines (22).

Laser photocoagulation is still the gold standard and most commonly used treatment. This method works by gently destroying the areas of the retina that don't have blood vessels, which helps lower the levels of a growth factor called VEGF. By doing this, it stops the abnormal blood vessels from growing. Ideally, treatment should happen within 48 to 72 hours after diagnosis, especially when the disease affects the back part of the retina (20).

Although laser therapy is effective, it can have some long-term side effects, such as causing severe nearsightedness (high myopia) and reducing peripheral vision (23).

In recent years, anti-VEGF drugs like bevacizumab and ranibizumab have become more commonly used to treat ROP. These medications are given through injections directly into the eye and are especially helpful for severe cases, like aggressive posterior ROP, or when laser treatment isn't possible because of the baby's health condition (24). While anti-VEGF therapy has shown promising results, there are still concerns about potential effects on the whole body and long-term safety, so careful follow-up is very important (25).

For advanced ROP (stages 4 and 5), where partial or total retinal detachment occurs, surgical intervention may be required. Procedures such as vitrectomy or scleral buckling can sometimes preserve or restore limited vision, though outcomes are variable. Unfortunately, access to these highly specialized surgical options remains restricted in many regions, leaving a significant gap in care for the most severely affected infants.

Long-Term Outcomes

Even when babies with ROP receive timely and successful treatment, they often need long-term follow-up because complications can still arise or persist over time. One of the most common issues is vision problems like high myopia (severe nearsightedness) and astigmatism, which can develop or worsen as the child grows.

Other ophthalmic sequelae include strabismus and amblyopia, which impair binocular vision and depth perception. In more severe cases, or when ROP is untreated, late onset retinal detachment may occur even years after the apparent regression of disease posing a lifelong risk to vision(23).

Beyond eye health, children born prematurely, especially those with ROP, are also at higher risk for developmental delays. This can include difficulties with movement, learning, and thinking skills. While these challenges are often related to prematurity itself rather than ROP

alone, they highlight the importance of ongoing, coordinated care for these children (24).

Taking care of these children requires a team effort. Regular check-ups with eye doctors, developmental experts, and neurologists are essential to catch any problems early and provide the right treatments. This coordinated approach helps give these kids the best chance for healthy vision and overall development (26).

Current Status in Albania

Despite important improvements in neonatal care in recent years, Albania still lacks a formal system for managing Retinopathy of Prematurity (ROP). At present, there are no national statistics or data on how common ROP is, and no centralized registry to track cases (based on a review of publicly available scientific literature and online databases, and EU-ROP registry).

This gap is especially worrying because more premature babies are surviving thanks to better neonatal care. These infants are known to be at high risk for developing ROP. Without regular eye exams and timely treatment, many of these vulnerable babies could have undiagnosed ROP that worsens over time putting them at serious risk of permanent vision loss.

By comparison, neighboring Kosovo has been rolling out ROP screening programs in its major hospitals since around 2015. Their experience shows that even countries with limited resources can successfully set up organized systems for screening and treating ROP especially when there's a coordinated national effort (27).

Similarly, other Eastern European countries with healthcare systems like Albania's report ROP rates between 20% and 30%, with about 5% to 10% of preterm babies needing treatment for severe forms of the disease (28,29).

Given Albania's similar economic and healthcare situation, it's likely that ROP affects a comparable number of infants though without data, this issue remains hidden and overlooked. This silent problem highlights the urgent need to raise awareness, build healthcare capacity, and develop national guidelines for early detection and treatment of ROP. The lack of data doesn't mean the disease isn't there; it shows a critical gap in neonatal care that needs immediate attention.

To help close this important gap, Albania's first national study on Retinopathy of Prematurity was launched in 2024. This ongoing observational project brings together a passionate team of ophthalmologists and neonatologists working in collaboration with the University of Medicine in Tirana, with support from the National Agency of Science and Innovation (NASRI). The study is taking place across two neonatal intensive care units (NICUs) and aims to understand how often ROP occurs, how severe it gets, and what risk factors like oxygen use, infections, or poor nutrition might be contributing. For the first time, Albania will have real data to help shape national guidelines, improve early detection, and invest in better eye care and equipment for preterm infants. It's not just about numbers it's about building a

stronger, more coordinated system to protect the vision of our most vulnerable newborns.

DISCUSSION

The lack of national data on Retinopathy of Prematurity (ROP) in Albania is a serious and urgent issue for newborn health. As neonatal intensive care improves and more premature and very low birth weight babies survive, those who are most at risk for ROP are increasing in number. Without a standardized screening program or a national registry, many cases might go unnoticed until the disease has progressed too far leading to preventable blindness in childhood.

In response to this gap, the observational study we are currently carrying out is a groundbreaking effort. It aims to provide the first clear picture of how common ROP is in Albania, identify risk factors, and assess current screening and treatment practices in neonatal units across the country. The results will help quantify the problem and guide the creation of screening guidelines and health policies tailored to Albania's needs.

Albania is in a great position to learn from its neighbors who have already made progress. For example, Kosovo started ROP screening in its main hospitals nearly ten years ago and continues to expand with coordinated regional efforts. Bulgaria has also established screening and treatment systems backed by national research and data. These examples show that even countries with limited resources can make real strides in ROP care through careful planning and investment.

Albania also has a great opportunity to speed up progress by working closely with neighboring countries and sharing knowledge. Joining regional networks in ophthalmology and neonatology, using telemedicine tools like remote RetCam imaging and virtual consultations, and taking part in joint training programs can all help build local expertise. Creating mentorship and referral connections with more experienced centers in the region could provide valuable support to Albanian neonatal units as they start to put screening programs in place.

The national study happening right now isn't just about gathering data it's also a powerful tool for change. The results should be used to encourage the government to support screening programs, include ROP care in national neonatal guidelines, and invest in the necessary eye care equipment and training.

Recommendations for Albania

Addressing Retinopathy of Prematurity in Albaniarequires a coordinated national approach grounded in evidence based practice. A key first step is the adoption of standardized screening criteria. International guidelines recommend systematic screening for all infants born at or before 31 weeks of gestation or weighing ≤1,500 grams at birth, with consideration also for high-risk infants up to 34 weeks or 2,000 grams where neonatal survival is improving (3). Given recent advances in neonatal care in Albania, applying

these criteria is crucial to ensure early detection and timely referral.

Establishing a national ROP registry would provide the epidemiological foundation needed to guide both clinical practice and health policy. Experiences from other countries show that registries can track risk factors, treatment patterns, and long-term outcomes, while supporting workforce planning and resource allocation (30). In the Albanian context, documenting gestational age, birth weight, oxygen exposure, disease stage, treatment type, and visual outcomes could represent a major step toward evidence based planning.

Sustainable progress also depends on strengthening the healthcare workforce. Neonatologists, nurses, and ophthalmologists need training not only in the theoretical aspects of ROP but also in practical skills for screening, timely referral, and management. Investment in diagnostic and treatment technologies such as indirect ophthalmoscopes, digital retinal imaging systems (e.g., RetCam), and teleophthalmology platforms can expand access to specialized care, particularly in resource limited settings (18).

Parental and public engagement is another essential component. Counseling for families of preterm infants can improve adherence to screening and follow-up, while broader awareness campaigns for healthcare professionals and the general public can emphasize that ROP-related blindness is largely preventable (12).

Finally, a long-term perspective is necessary. Children who have been treated for ROP, or remain at risk, are vulnerable to later complications such as refractive errors, strabismus, and amblyopia, all of which require structured follow-up through childhood (5).

Taken together, these interrelated strategies standardized screening, national data collection, workforce development, technological support, parental engagement, and structured long-term follow-up form a comprehensive framework for preventing ROP. Integrating this framework into neonatal and ophthalmic services would help align Albania with international standards while addressing the country's specific demographic and healthcare challenges in a sustainable way.

CONCLUSION

Retinopathy of Prematurity (ROP) remains a quiet but serious threat to the eyesight of Albania's most fragile newborns. As advances in neonatal care allow more premature babies to survive, the risk of ROP and the potential for preventable blindness grows alongside. This makes ROP prevention and early detection more important than ever before.

This article brings together global knowledge and evidence on ROP, but more importantly, it serves as a wake-up call for Albania. It highlights the urgent need to recognize and address this condition before it leads to avoidable vision loss in children. The results from Albania's first-ever national ROP study will provide essential insights

into how widespread the problem is and what specific risk factors are most relevant locally.

Armed with this data, healthcare providers and policymakers will be better equipped to design effective, tailored strategies that fit Albania's unique healthcare setting. These efforts can pave the way toward a stronger, more resilient neonatal eye care system one that ensures every premature infant receives timely screening, proper treatment, and long-term support to protect their vision and quality of life.

Ultimately, addressing ROP is not just a medical issue, it's a vital step toward safeguarding the future of Albania's children, giving them the chance to grow, learn, and thrive with healthy vision.

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