

Original Article

# Incidence of retinopathy of prematurity at two tertiary centers in Jeddah, Saudi Arabia



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## Abstract

**Purpose:** To review the incidence and risk factors for retinopathy of prematurity (ROP) King Faisal Specialist Hospital and King Abdulaziz University Hospital in Jeddah, Saudi Arabia.

**Material and methods:** In this prospective cohort study, preterm infants who were admitted to a neonatal intensive care unit from 2012 to 2013 were evaluated for ROP. Inclusion criteria were, preterm infants with gestational age <32 weeks and/or birth weight <1500 g. The risk factors that were assessed were intraventricular hemorrhage, patent ductus arteriosus (PDA), sepsis and hydrocephalus. The relative risk was used to measure the risk and logistic regression was used to adjust for confounding factors. Statistical significance was indicated by  $p < 0.05$ .

**Results:** Thirty-one of 92 (33.7%) preterm infants had unilateral or bilateral ROP. The mean gestational age was 26.7 weeks (range, 24–29 weeks) and mean birth weight was 0.843 kg (range, 0.606–1.450 kg). There were 7 infants with stage 1 ROP, 10 infants with stage 2, 14 infants with stage 3 and no cases of stage 4 or 5. Twelve (13%) infants had plus disease and received laser therapy within 72 h of diagnosis. Statistically significant risk factors for ROP were PDA ( $p = 0.0005$ ) and intraventricular hemorrhage ( $p = 0.0005$ ).

**Conclusion:** The incidence of ROP was 33.7% and risk factors were PDA and intraventricular hemorrhage. Laser therapy was very effective for the treatment of plus disease and preventing progression of ROP. Clinicians should assess for potential risk factors when monitoring premature infants.

**Keywords:** Retinopathy of prematurity (ROP), Plus disease, Threshold disease, Patent ductus arteriosus, Hydrocephalus, Intraventricular hemorrhage

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## Introduction

Retinopathy of prematurity (ROP) is an abnormal growth of retinal blood vessels that affect premature infants born at or before 32 weeks and weighing 1500 g or less at birth. ROP is usually bilateral and can lead to lifelong vision impairment or blindness.<sup>1</sup> The smaller an infant at birth, the greater the likelihood of developing ROP. However, ROP can affect

larger and more mature infants. A study of ROP in Riyadh, Saudi Arabia reported 56% of all premature births developed ROP and 15% of these patients had stage 3 disease (severe ROP).<sup>2</sup> The mean gestational age (GA) of the ROP patients was 30 weeks.<sup>2</sup>

In 2010, approximately 184,700 (uncertainty range, 169,600–214,500) preterm infants developed ROP (all stages) worldwide. Twenty-thousand (range, 15,500–27,200) of these

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infants were severely visually impaired or blind. Additionally, 12,300 (8,300–18,400) preterm babies had mild to moderate visual impairment. Sixty-five percent of patients who are visually impaired due to ROP, were born in middle-income regions; 6.2% (4.3–8.9%) of all visually impaired infants with ROP were born later than 32 weeks gestational age.<sup>3</sup> In the majority of cases, ROP regresses and improves with observation. However, a small percentage of infants develop severe ROP that warrants laser treatment.

This prospective study evaluates the incidence of ROP among highly vulnerable infants at 32 weeks (or younger) gestational age and/or weighing less than 1500 g at birth. Additionally, the risk factors for ROP that contributed to ROP in this Saudi Arabian study population were evaluated.

## Material and methods

This prospective, cohort study evaluated the incidence of ROP at the two hospitals and investigated the risk factors for ROP. This study evaluated premature infants for ROP who are admitted to the neonatal intensive care unit (NICU) from September 2012 to October 2013 at King Faisal Specialist Hospital and King Abdulaziz University Hospital in Jeddah, Saudi Arabia. Both facilities are tertiary care hospitals that treat ROP cases referred from the entire country. The research committee and biomedical ethics unit at King Abdulaziz University Hospital approved this study.

Inclusion criteria were, all infants who born  $\leq 32$  weeks gestational age and/or birth weight  $\leq 1500$  g. Infants born before 27 weeks were screened at 30–31 weeks postmenstrual age (PMA). Infants born after 27 weeks or weighing  $< 1500$  g were screened at 28–35 days postnatal age and screened weekly or every 2 weeks.<sup>4</sup> All infants were followed up till they developed ROP or the retina was fully vascularized.

All infants underwent indirect ophthalmoscopy after pupil dilation with 1% topical mydriacyl with a 28 D lens, insertion of a sterile lid speculum and scleral depression. Data were collected on gestational age, birth weight, risk factors, stage of ROP, zone of ROP, presence of plus disease, presence of threshold disease and the type of treatment.

A group of infants who did not develop ROP was compared to the group who developed ROP for the presence and absence of risk factors (Table 4). The risk factors that were assessed were, intraventricular hemorrhage, patent ductus arteriosus (PDA), sepsis, and hydrocephalus. The infants were assessed regularly until the retina was fully vascularized. Treatment was performed within 72 h of diagnosis. Infants who did not require laser treatment underwent routine vision screening, unless there was a specific concern. The indications for treatment of severe ROP were: zone I, any ROP with plus disease; zone I, stage 3 without plus disease; zone II, stage 3 with plus disease or; zone II, stage 2 with plus disease.<sup>5</sup>

## Statistical analysis

The data were collected for statistical analysis and entered into the statistical package for social sciences (IBM Corp., Armonk, NY, USA). The relative risk was used to measure the risk and logistic regression was used to adjust for

confounding factors. A *p* value less than 0.05 was considered statistically significant.

## Results

Ninety-two premature infants were screened for ROP. There were 31 (33.7%; 16 females and 15 males) infants diagnosed with ROP and 12 (13%) infants required laser treatment. The mean gestational age was 26.7 weeks (range, 24 weeks to 29 weeks) and the mean birth weight was 0.843 kg (range, 0.606–1.450 kg).

There were fourteen (45.2%) infants with stage 3 ROP which was the most common type of ROP in this study (Table 1). The majority of cases (20 infants; 64.5%) were found in zone 3 (Table 2). The fewest cases of ROP were in zone 1 (2 cases; 6.5%) (Table 2). All cases needing treatment received laser therapy within 72 h of diagnosis (Table 3).

After adjusting for confounding factors with logistic regression, PDA and IVH had a significant effect on the occurrence of ROP. Hydrocephalus and sepsis were not significant risk factors for ROP (Tables 4 and 5). Laser photocoagulation was very effective in treating ROP. Out of all 31 patients with ROP, 19 cases regressed with observation and 12 cases regressed with laser therapy.

## Discussion

The incidence of ROP is rising in developing countries and some premature infants with ROP are heavier than 1500 g. In Western countries, extremely low-birth-weight infants ( $\leq 1000$  g) are surviving due to advances in neonatal care. Hence there is an increase in the incidence of ROP in Western countries also. The mean birth weights of infants from highly developed countries ranged from 737 g to 763 g compared with values ranging from 903 g to 1527 g in less developed countries.<sup>6</sup> Mean GAs of infants from highly developed countries ranged from 25.3 weeks to 25.6 weeks compared to 26.3–33.5 weeks in less developed countries.<sup>6</sup>

A 2003 study of infants at King Khalid University Hospital in Riyadh, Saudi Arabia, reported an incidence rate of 41% for infants weighing  $< 1500$  g and the mean gestational age was 28 weeks and the mean birth weight was 1103 g.<sup>7</sup> Similarly, our study reported a relatively high incidence of ROP at 33.7% for infants weighing  $< 1500$  g with mean gestational age of 26.6 weeks and mean birth weight of 0.843 g. Another study in Saudi Arabia reported an incidence of ROP was 56% with a mean gestational age of 30 weeks for ROP patients and 15% of the patients were in stage 3 disease (severe ROP).<sup>2</sup> However, in our study there were 13% of cases with severe ROP that received laser treatment. A study from King Fahad Medical City, Saudi Arabia evaluated premature infants born at gestational age (GA) 32 weeks or younger

**Table 1.** Stages of the retinopathy of prematurity among premature infants from two tertiary care hospitals in Saudi Arabia.

Stage of ROP	Frequency (infants)	Percentage (%)
1	7	22.5
2	10	32.3
3	14	45.2
Total	31	100

ROP = retinopathy of prematurity

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