Incidence and Risk Factors for Retinopathy of Prematurity in Tabuk City, KSA

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Abstract:

PURPOSE: Retinopathy of prematurity (ROP) is becoming a leading cause of preventable blindness. The current study aimed to assess ROP and its risk factors in Tabuk City, Northern Kingdom of Saudi Arabia.

METHODS: A retrospective study was conducted in King Khalid Hospital, Tabuk City, Saudi Arabia. The premature infants' records during the period of January 2016 to April 2018 were approached. One hundred and eight records were eligible; the infants' gestational age, weight, if received oxygen, surfactant use, blood transfusion, intraventricular hemorrhage, and patent ductus arteriosus were reported. Chi-square test was used to compare premature infants and their counterparts regarding various risk factors. P < 0.05 was considered statistically significant.

RESULTS: Out of 108 premature infants, 33.3% had ROP (Many were sight-threatening [stages required treatment] and more than two-thirds involving both eyes); a statistically significant difference (P < 0.05) was evident between infants with prematurity and low birth weight. No significant differences were found regarding other risk factors (P > 0.05). Only 8.3% received interventional therapy.

CONCLUSION: ROP is common in King Khalid Hospital, which is the referral tertiary hospital in Tabuk city, KSA. The low birth weight is a significant risk factor to develop ROP. Many of ROP cases were sight-threatening (cases that required treatment) and most cases involving both eyes. Treatment availability at Tabuk city is recommended, instead of referral to another centers especially among those with low weight at birth.

Keywords: Retinopathy of prematurity, retinopathy of prematurity risks, Saudi Arabia, Tabuk

Introduction

Retinopathy of prematurity (ROP) is a disease of the eye, which is considered as one of the complications of preterm birth, which is characterized by abnormal growth of retinal blood vessels at a junction of the vascularized retina and avascular peripheral retina, and it is one of the causes of blindness that can be prevented by early screening and intervention.¹²

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be 56% in 2008 and another study conducted in Jeddah in 2016 reported the incidence of ROP to be 33.7%.[1‑5] ROP is classified into five stages: Stage 1 is a demarcation line, Stage 2 is a ridge with height and width, Stage 3 is a proliferation of fibrovascular in extraretinal, Stage 4 is partial retinal detachment, and Stage 5 is total RD.[2] The major risk factors for the development of ROP which had been investigated in many studies include low gestational age at birth, low body weight, duration of oxygen administration, neonatal intensive care unit (NICU) admission, and number of days of hospital stay.[1,2,5‑8] The other risk factors for ROP include surfactant therapy, sepsis, intrauterine growth restriction (IUGR), intraventricular hemorrhage, patent ductus arteriosus (PDA), and blood transfusion.[1,2,6,9]

However, there are no studies conducted in Tabuk city, which comprises the largest population in Northern Saudi Arabia, about the incidence of ROP and its risk factors. We aimed to report the incidence and risk factors of ROP in prematurely born children and investigate the common risk factors for ROP in Tabuk City, Saudi Arabia.

Materials and Methods

A retrospective study was conducted at King Khaled Hospital in Tabuk city to evaluate all preterm infants for the development of ROP.

Medical records of all premature infants admitted to NICU from January 2016 to April 2018 who were fitting our criteria were reviewed. We included 108 infants (36 with prematurity vs. 72 controls). The records were approached confidentially, and the parents were assured that the collected data will be used only for the purpose of the research.

Inclusion criteria

All premature infants who were born in <34 weeks gestational age and/or with birth weight <1500 g were included in the study. We used the International Classification of Retinopathy of Prematurity for classifying the zones and stages of ROP cases.

The data were collected by a questionnaire which included questions on gender, gestational age at birth, body weight at birth, oxygen therapy and duration of administration, NICU admission and number of days of hospital stay, surfactant therapy, sepsis, IUGR, intraventricular hemorrhage, PDA, blood transfusion, and stage of ROP. The analysis included descriptive statistics and graphs.

Ethical consideration

The study proposal was sanctioned and approved by the ethical committees of the Medical College, University of Tabuk, and King Khaled Eye Specialist Hospital Riyadh.

Statistical analysis

The collected data were entered and analyzed using the Statistical Package for Social Sciences (SPSS) statistical program version 19 (Armonk, NY: IBM Corp.). The Chi-square test was used to compare those with ROP and their counterparts without retinopathy. $P < 0.05$ was considered statistically significant.

Results

There were 108 premature infants (36 cases with retinopathy vs. 72 without retinopathy): 65.5% of the infants were males, the gestational age was ≤32 weeks in 91.7% of infants, the weight was 1000–1500 in more than two-thirds (72.2%), 97.2% received supplemental oxygen at pulse oximetry saturations of 96%–99%, and 76.2% received surfactant. In the present study, sepsis, IGR, intraventricular hemorrhage, and PDA were reported in 43.5%, 18.5%, 13%, and 10.2%, respectively, while 40.7% received a blood transfusion [Table 1].

In the current study, both eyes were affected by retinopathy in 77.8%, left eye was affected in 16.6%, while the right eye was involved in only 5.6% of cases [Figure 1]. The most common stage of retinopathy was Stage 1 (66.7%), followed by Stage 2 (27.8%) and Stage 3 (5.6%). The present data showed that zone 111

Table 1: Clinical characteristics of patients with retinopathy

| Characteristics       | $n$ (%) |
|-----------------------|---------|
| Gender                |         |
| Male                  | 62 (56.5) |
| Female                | 47 (43.5) |
| Gestational age at birth (weeks) | |
| ≤32                   | 99 (91.7) |
| 33-34                 | 9 (8.3)  |
| Gestational weight at birth | |
| <1000                 | 14 (13.0) |
| 1000-1500             | 78 (72.2) |
| >1500                 | 16 (14.8) |
| Oxygen therapy received | 105 (97.2) |
| Stay >7 days in NICU  | 107 (99.1) |
| Duration of oxygen therapy (days) | |
| >7                    | 80 (74.1) |
| ≤7                    | 26 (24.1) |
| Surfactant therapy received | 82 (76.2) |
| Sepsis                | 47 (43.5) |
| Intrauterine growth retardation | 20 (18.5) |
| Intraventricular hemorrhage | 14 (13.0) |
| Patent ductus arteriosus | 11 (10.2) |
| Blood transfusion     | 44 (40.7) |
| Developed ROP        | 36 (33.3) |

NICU: Neonatal intensive care unit, ROP: Retinopathy of prematurity
was the most sites involved (69.4%), while zones 11 and 1 were involved in 27.8% and 2.7%, respectively, [Figure 2]. Retinal detachment was observed in 2.7% of cases; intervention was needed in 8.3% [Table 2].

In the current study, no statistically significant differences were evident regarding ROP between males and females (32.2% vs. 36.9%, $P = 0.405$) and gestational age (34.3% among those $\leq 32$ weeks vs. 22.2% among those with a gestational age of 33–34 weeks, $P = 0.715$, 95% confidence interval [CI] = 0.36–9.30). A statistically significant difference was found in the relation between the birth weight and severity of ROP stages (higher [71.4%] among those <1000 weight), followed by 1000–1500 (30.7%) and those whose body weight was >1500 (12.5%), $P = 0.002$. No significant differences were reported regarding oxygen therapy (34.3% vs. 0.00%, $P = 0.214$; 95% CI = 1.32–1.74) and surfactant therapy (36.1% vs. 23.1%, $P = 0.213$, 95% CI = 0.88–1.43). Table 3 depicts the differences between infants with ROP and their counterparts without retinopathy.

**Discussion**

ROP is a leading cause of childhood blindness. In the present study, weight at birth is a significant risk factor (those with a weight of <1000 are more commonly affected); the current findings are in line with a previous study[10] which stated that low birth weight in relation to weeks of pregnancy is among the significant risk factors. The present findings are in similarity with that of Celebi et al.[11] The current study showed no statistically significant differences between infants with retinopathy and their counterparts regarding blood transfusion (ROP was higher among those who received blood transfusion but not amounting to statistically significant difference), sepsis, and gestational age at birth in contradiction to a study conducted in Turkey[12] and concluded that culture-confirmed sepsis, blood transfusion, and gestational age at birth were risk factors of ROP. A plausible explanation may be that the previous study assessed ROP requiring laser intervention which is not the case in the current study that investigated all the patients with ROP whether they need laser intervention or not. Another explanation could be the relatively small sample size of the current study. In the present study, no significant differences were found between those with intraventricular hemorrhage, surfactant use, and PDA and those without; the current finding is not in agreement with previous studies.[11–13] A recent study published in Canada showed that early surfactant use was not associated with a statistically significant reduction in ROP in agreement with the current observations.[13] A study conducted in the sub-Saharan Africa[14] found no association with sepsis and ROP, matching the current findings. The risk factors for ROP could be affected by neonatal mortality, race, and level of care provided; the current data were collected from a secondary care hospital with a lack of ophthalmologists. The present study showed no significant differences between infants with ROP and those without regarding gender, in contradiction to a study published in Canada,[15] and found that males were affected by severe ROP.
The current data showed that 33.3% of premature infants were affected by ROP, in line with previous studies from the USA and higher than a study from Brazil. A study conducted in Indonesia concluded a similar prevalence. A study conducted in Kenya showed that the majority of retinopathy were Stage 1 and 2 and are similar to the current findings. However, in our study, We are surprising to observe that, despite many cases of vision-threatening retinopathy of prematurity (ROP stages that require intervention), only 8.3% received interventional treatment by referral them to higher centers in the big cities in KSA, this may can be explained by that, many families seeking treatment at near countries like Jordan which is closer than travel to referred center in KSA. It is prudent to adhere to the recent guidelines to early detect and treat this potentially avoidable loss of vision in our region. In the Kenyan study the most involvement zone was ZONE II which are different from our study, in which Zone III was the most involved area. The current findings favor the use of the British Association for Perinatal Medicine and the College of Ophthalmologists which recommend screening only infants <1500 g at birth rather than the revised guidelines of the American Academy of Pediatrics, the American Association for Pediatric Ophthalmology and Strabismus, and the American Academy of Ophthalmology that recommend screening for ROP in all infants with birth weight <1500 g or gestational age of 32 weeks or less. 

The limitations of the study were the retrospective nature, the relatively small size of the study sample, and the fact that the study was conducted at a single hospital, so generalization cannot be insured. Larger multicentric prospective studies to assess the prevalence, risk factors, and outcomes of ROP are highly recommended.

**Conclusion**

ROP is common among premature births in Tabuk, Saudi Arabia. It affects infants with low birth weight, in particular, those who weigh <1000 g at birth. The majority were sight threatening. The implementation of screening and preventive measures and early intervention are highly needed.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

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