Original Article

Changing patterns of early childhood blinding conditions presenting to a tertiary eye center: The epidemic of retinopathy of prematurity in India

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Purpose: Retinopathy of prematurity (ROP) is now emerging as one of the major causes of preventable childhood blindness. The proportion of preterm babies has increased dramatically over the past decade. Our study aims to emphasize the need for ROP screening and management services in these preterm infants. **Methods:** ICD-coded medical records of children less than 10 years of age presenting to a subspecialty eye hospital from 2000 to 2017 were reviewed. ROP, congenital cataract, congenital glaucoma, and vitamin A deficiency were the most common diagnoses. We evaluated the trend of these diseases from 2000 to 2017. **Results:** Our data suggested a 20-fold increase in the attendance of children with a diagnosis of ROP who now make over 2% of outpatient children. Vitamin A deficiency has declined over time whereas cataract and glaucoma have remained stable. **Conclusion:** Our data indicate a need to scale up ROP screening integrated with neonatal care, as well as to build capacity for the treatment of acute and late-stage ROP in India.

Key words: Epidemiology, India, retinopathy of prematurity

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Retinopathy of prematurity (ROP) is emerging as one of the major causes of avoidable blindness in children. The Indian National Programme for Control of Blindness states the prevalence of childhood blindness to be 0.8/1000 children.[1] Over the years, studies in the country have reported the incidence of babies with any form of ROP from as low as 2.3% to 47.1%.[2-7] The proportion of preterm infants requiring screening and treatment for ROP has increased over the years owing to better neonatal healthcare facilities and improved neonatal survival. However, many neonatal units currently lack these services. Various programs are being conducted across the country in an attempt to bridge this gap.[8,9] Our institute is involved in screening for ROP across the twin cities of Hyderabad and Secunderabad, India. The number of NICUs covered range from 5–12 (five units routinely every week) in a given week and are based on calls from neonatologists.[9] However, NICU in most parts of the country do not integrate this care.

This study aims to describe the number of children managed for the four most common blinding eye diseases of childhood and to identify their trends over time, which could provide evidence on increasing need to emphasize on the requirement for ROP screening services and its integration in neonatal and ophthalmic healthcare plans.

Methods

This was a retrospective observational study. Data from ICD-coded medical records system at L V Prasad Eye Institute, Hyderabad were reviewed from January 2000 to December 2017.

Four most common causes of treatable/preventable visual impairment that need tertiary care in early childhood were identified in children less than 10 years of age. These included vitamin A deficiency, congenital cataract, congenital glaucoma, and ROP. Any other cause for visual impairment was excluded from the analysis. Refractive errors were excluded as they can be managed at a primary or a secondary level of care. Infants evaluated and managed for ROP included those who attended screening for the first time, those who had not received care in the NICUs, those who were referred from an ROP-trained ophthalmologist from other institutions and self-referrals. Infants referred from our screening program for further management were included, but not those who completed screening in NICUs to avoid bias. The number of interventions for ROP, i.e., laser photocoagulation, intravitreal anti-VEGF injections, or pars plana vitrectomy were documented for each year and the change in number was noted. The absolute number of children with these conditions and the ratio to the total number of children less than 10 years per year were calculated. To analyze trends in the number of children who presented with each diagnosis, the study period

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was divided into three groups of 6 years: Group 1: 2000–2005, Group 2: 2006–2011, and Group 3: 2012–2017.

Results

A total of 639,407 children aged less than 10 years were examined in the outpatient department during the study period. Fig. 1 shows the number of children by diagnosis over the 18-year period. In the year 2000, premature babies constituted 4.5 per 1000 of the children seen in our outpatient department who were screened for ROP. This ratio increased to 25.8 per 1000 in the year 2017. Table 1 shows the change of attendance in the outpatient department of the four diseases during the study period. Fig. 2 shows the number of children/1000 child outpatients for vitamin A deficiency, congenital cataract, congenital glaucoma, and ROP in the three study periods.

A total of 22,176 eyes of 11,088 children were evaluated and managed for ROP over 18 years. A total of 2,811 of these children (25.4%) required treatment for ROP. Fig. 3 shows the number of children requiring ROP evaluation from 2000 to 2017 and those treated for ROP (19 times). The number of babies evaluated for ROP increased from 87 in 2000 to 1727 in 2017. Similarly, the number of babies requiring treatment increased from 38 in 2000 to 489 in 2017 (12 times).

Multiple treatment sessions (n = 14615) were required for ROP, including laser photocoagulation, intravitreal anti-VEGF injections, and/or vitreo-retinal surgery for advanced ROP. The number of treatment sessions increased from 2,919 in 2000–2005 to 5,254 in 2012–2017.

A total of 8,277 (74.6%) children did not undergo any intervention after evaluation for ROP. These included those who did not develop ROP, had no treatment requiring ROP and advanced ROP, and were too late to consider vitreo-retinal surgical procedure.

Discussion

Our study showed a 19-fold increase in the number of preterm babies who had an ICD code of relevance to ROP over the last 18 years. About one-fourth of these required treatment for ROP. This figure strongly points toward the increasing burden of neonatal eye healthcare and evaluation for ROP.

ROP, which develops in preterm neonates after birth, is a potentially avoidable cause of vision impairment and blindness. According to the WHO data of 2010, 3.5 million of 27 million babies born in India were premature.[10] The survival of these babies in the past was difficult due to absence of neonatal services in many parts of India. Since 2011, under the facility-based newborn care, a Government of India initiative, approximately 650 Special Newborn Care Units (SNCUs)

Table 1: The change of attendance in the outpatient department of vitamin A deficiency, congenital cataract, congenital glaucoma, and for screening for ROP during the study period

	2000-2005 (n=151,423)	2006-2011 (n=211,736)	2012-2017 (n=276,248)
Vitamin A deficiency	0.61	0.24	0.10
Cataract	6.39	5.30	4.37
Glaucoma	3.67	3.57	3.29
ROP	9.80	13.85	23.43

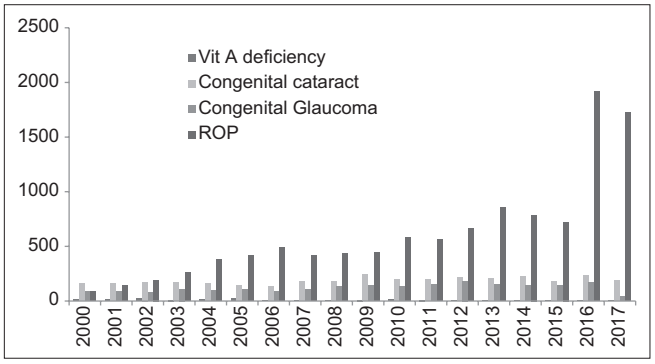

Figure 1: Annual number of children presenting with vitamin A deficiency, congenital cataract, congenital glaucoma, and for screening for ROP between 2000 and 2017

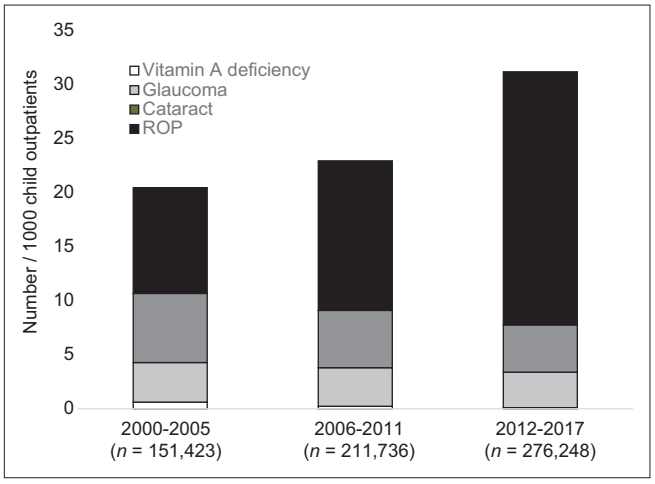

Figure 2: Number of children/1000 child outpatients for with ICD codes for vitamin A deficiency, congenital cataract, congenital glaucoma, and ROP in the three study periods

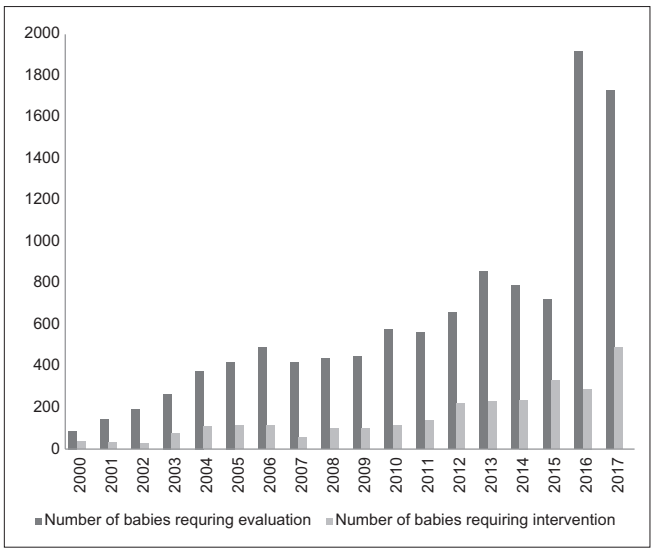

Figure 3: Annual number of children screened and treated for ROP from 2000 to 2017

have been established at the district level over the last decade. The provision of these facilities has led to greater survival of premature babies who are at risk of ROP. Our data also shows a spurt of increase in number of babies with ROP between 2012 and 2017.

A 19-fold increase in the number of babies evaluated and 12-fold increase in the number of babies requiring interventions was noted in our data. This increase could be due to better survival of preterm babies, easily accessible neonatal services across the country, inadequate screening and treatment, and increased awareness among the caregivers regarding the need for management of ROP and recognition of our institute as a referral center for the same. The National Programme for Control of Blindness used the 2010 census and recognized refractive error and cataract as the major causes of preventable blindness and visual impairment among children in India. However, over the past decade, blindness in India due to ROP has increased.[11]

Conclusion

Our study shows for the first time data regarding the increasing trend in the number of premature children with a diagnosis of ROP presenting to a tertiary eye hospital; what started as a trickle in the 1990s has now grown to epidemic proportions. This emphasizes not only the need for an organized approach for training of professionals for the screening and management of these preterm infants but also the need for rapid and timely integration of ROP services within neonatal care.

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Conflicts of interest

There are no conflicts of interest.

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