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High burden of treatment-requiring retinopathy of prematurity in Kathmandu, Nepal: a prospective multicentre observational study

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Abstract

Background: Retinopathy of prematurity (ROP) is an important cause of avoidable childhood blindness in low- and middle-income countries, where increasing survival of preterm infants has outpaced improvements in neonatal care. We assessed the frequency, severity and treatment requirements of ROP across neonatal intensive care units (NICUs) and specialist eye centres in the Kathmandu Valley.

Methods: This prospective multi-centre observational cohort study was conducted from February–November 2025 at two level III NICUs and two tertiary eye centres in Kathmandu. Preterm infants with a gestational age (GA) <34 weeks and/or a birth weight (BW) <2000 g, and infants of 34–36 weeks GA with risk factors, were enrolled. Bilateral wide-field retinal imaging was performed at serial examinations and ROP was classified according to ICROP-3. The primary outcome was development of type 1 ROP. Baseline characteristics were compared between infants who developed type 1 ROP and those with type 2 ROP or no ROP using t-tests and chi-square tests, with odds ratios (OR) and 95% confidence intervals (CI) for factors estimated for prespecified factors associated with type 1 ROP.

Results: Of 222 infants who underwent at least one ROP examination, 208 completed follow-up to complete retinal vascularisation or disease resolution. Among these 208 infants, 76 (36.5%) developed ROP, including 46 (22.1%) with type 1 ROP and 30 (14.4%) with type 2 ROP. Aggressive posterior ROP (A-ROP) occurred in 14 (6.7%) infants. Infants who developed type 1 ROP had lower mean GA and BW than those with type 2 ROP or no ROP. BW ≤1500 g was associated with type 1 ROP (OR 2.99, 95% CI 1.73–5.18). Type 1 ROP was more frequently observed among infants screened at specialist eye centres than NICUs (OR 3.12, 95% CI 1.67–

5.80), although this comparison may reflect referral selection. ROP was present at the first examination in 60 of 222 infants (27.0%). 3/25 infants (12.0%) outside the principal enrollment thresholds developed ROP, including 1/25 (4.0%) with type 1 ROP.

Conclusions:

ROP, including Type 1 disease, was frequently observed, with some cases detected at the initial screening and among infants beyond conventional eligibility criteria, underscoring the need for Nepal-specific screening guidelines and strengthened referral pathways.

Trial registration: Registered as https://www.isrctn.com/ISRCTN62477762 on the date 02/11/2025

Keywords: Retinopathy of prematurity, Preterm infant, Neonatal screening, Birth weight, Gestational age, Aggressive posterior ROP, Nepal, Low- and middle-income countries

Background

Preterm birth is a major global health problem with the greatest burden occurring in low and middle income countries, particularly in South Asia, with 13.4 million preterm births occurring annually worldwide [1]. The latest global figures from 2010 estimated 184,700 preterm infants developed retinopathy of prematurity (ROP), of whom more than 10% experienced severe visual impairment [2]. Between 2010 and 2019 the reported burden of ROP is estimated to have increased substantially in low- and middle-income countries (LMICs) [2-4]. In South Asia, the epidemiology of ROP represents the emerging "third epidemic", driven by improved survival of premature infants without parallel advances in neonatal care [4]. Studies from India have reported ROP proportion developing ROP during follow-ups ranging from 18.5% to 28.5%, with treatment-requiring ROP (TR-ROP) occurring in 2.4–4.5% of screened infants [5–8]. A South Indian cohort reported a particularly high ROP proportion developing ROP during follow-up of 41.5%, of which 26.4% required treatment [9]. Evidence from Nepal is limited to a small number of single-center studies, most of which had small sample sizes, cross-sectional designs, or were conducted many years ago; these reported an proportion developing ROP during follow-up of ROP of 22–30%, with TR-ROP in 3.2–6.4% [10–14].

Unlike high-income countries, where severe ROP is largely confined to extremely premature infants, larger and more mature infants who fall outside their screening criteria are also developing severe disease in LMICs [15]. Unregulated oxygen therapy, neonatal infection, inadequate nutritional support and delayed screening are the principal contributors to this risk [5, 11, 12]. Aggressive posterior ROP (A-ROP), a rapidly progressive and vision-threatening form of the disease, has also been reported with increasing frequency in these settings [16, 17]. In Nepal, approximately 81,000 preterm births occur annually, with nearly 95% of these infants surviving

[18]. As neonatal care and technology advance and the survival of extremely premature infants improves, a parallel rise in ROP proportion developing ROP during follow-up is expected [19]. Prospective multicenter studies are therefore needed to determine the proportion developing ROP during follow-up of ROP in Nepal.

Most estimates of ROP burden in Nepal have arisen from individual neonatal or ophthalmic centers, making it difficult to distinguish the disease burden observed among infants undergoing routine NICU screening from that observed among infants referred to specialist eye services. Comparing these settings may therefore help characterize the spectrum of disease reaching different levels of care and identify potential gaps in screening and referral. The objectives of our study were to: (1) estimate the proportion of screened infants developing ROP during follow-up; (2) describe the severity, timing of detection and treatment requirements of ROP; and (3) compare disease characteristics between infants screened in NICUs and specialist eye centers, including the occurrence of ROP among infants outside commonly used High-income screening thresholds.

Methods

Study design and setting

This prospective observational cohort study was nested within the ongoing Telemedicine and Artificial Intelligence (AI) ROP project registered with the International Standard Randomized Controlled Trial Number registry [20]. The first phase of this project involved setting up telemedicine screening by technicians at all sites. The present analysis presents results from this first phase with included infants enrolled between 1 February to 30 November 2025 at two level III NICUs and two tertiary eye care centers.

NICU A is a government teaching hospital and national referral center that manages 3000–4000 deliveries annually, of which approximately 15% are preterm, and provides ROP services through the affiliated Eye Centre A. Eye Centre A offers bedside screening and treatment for both inborn and referred infants. NICU B is a private medical college hospital providing advanced neonatal care and ROP screening; infants requiring treatment are referred to Eye Centre B, a tertiary ophthalmic referral institute offering comprehensive outpatient ROP screening and treatment. Both eye centers provide laser therapy, anti-vascular endothelial growth factor (anti-VEGF) treatment and surgical care for advanced ROP. Although both NICUs follow standard neonatal protocols, differences in oxygen monitoring, staffing and referral systems may influence ROP outcomes. All participating centers maintained established referral linkages and coordinated data collection through electronic case report forms (eCRFs). The eye centers also received infants referred from other hospitals, whereas NICU recruitment primarily comprised infants receiving neonatal care at the participating hospitals. Thus, the populations screened in the two settings were not expected to be comparable in referral status or baseline risk.

The study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.

Study participants

Infants meeting the ROP screening criteria used in the participating centers were eligible for inclusion, namely infants with a gestational age (GA) <34 weeks and/or a birth weight (BW) <2000 g, and infants of 34–36 weeks GA with risk factors. Risk factors comprised the need for respiratory support, oxygen therapy for more than 6 hours, sepsis, episodes of apnea, the need for blood transfusion or exchange transfusion, or an unstable clinical course as determined by the attending pediatrician [21]. Infants who had already been treated for ROP before enrolment were excluded.

All eligible infants were enrolled after written informed consent had been obtained from a parent or legal guardian.

Study procedures

A pretested case report form was used to collect antenatal, perinatal and postnatal information from parents and from newborn medical records. Eligible infants born at participating hospitals underwent their first ROP examination within 30 days of birth, with earlier examination prioritized for infants <28 weeks' GA or BW <1200 g. Infants referred from outside hospitals underwent examination at their first visit to the participating eye center [22].

Before fundus imaging, pupillary dilatation was achieved with tropicamide 0.5–1% and phenylephrine 2.5%, administered as one drop two to three times at 10–15-minute intervals. Bilateral retinal images were captured using a standard portable wide-field imaging system (3nethra neo, Forus Health, Bangalore, India) by trained optometrists or ophthalmic assistants. Images were reviewed by an ophthalmologist experienced in ROP, who recorded the ROP diagnosis and ICROP-3 classification in the eCRF. Where clinical examination was performed in addition to imaging, the clinical examination by indirect ophthalmoscopy was considered the reference standard for management decisions. All images were reviewed at biweekly clinical ROP meetings with all clinicians from all sites where final diagnosis was given and image quality assessed.

The timing of subsequent examinations was determined according to retinal findings and clinical need, with examinations generally repeated at two-week intervals. Infants who did not attend follow-up examinations before completion of retinal vascularization were contacted by telephone to establish their subsequent follow-up and visual status. Those unable to return to a study site

were advised to continue follow-up at a nearby center, and completion of vascularization was confirmed by asking families to provide the relevant outpatient documentation. Complete retinal vascularization was defined as the extension of retinal vessels to the temporal ora serrata. Following treatment, regression of ROP was defined by the thinning and whitening of the neovascular tissue.

Definitions

ROP was classified according to the revised International Classification of Retinopathy of Prematurity (ICROP-3) [23]. Type 1 ROP was defined according to established treatment criteria as any stage of ROP in zone I with plus disease, stage 3 ROP in zone I without plus disease, or stage 2 or 3 ROP with plus disease in zone II, in either eye [24. We used type 1 ROP as the primary measure of treatment-eligible disease (treatment requiring or TR ROP), actual treatment received was analyzed separately. [24]. For descriptive purposes, first examination by 30 postnatal days or 33 weeks PMA was classified as early/on-time according to the operational screening protocol used in this study

Statistical analysis

The data entry and management team, in coordination with the clinical team, reviewed and verified the data for completeness. Data were entered into the Survey Solutions data processing system, and the cleaned dataset was exported to IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA) for analysis. For this analysis, participants enrolled during the initial 10-month period, from February to November 2025, were included.

Continuous variables were summarized using means and standard deviations (SDs) where approximately normally distributed and medians and interquartile ranges (IQRs) otherwise. Categorical variables were summarized using frequencies and percentages. Baseline characteristics were compared between infants who developed type 1 ROP and those who developed type 2 ROP or no ROP using independent-samples t-tests or Mann–Whitney U tests for continuous variables, as appropriate, and chi-square or Fisher's exact tests for categorical variables.

Associations between prespecified characteristics and type 1 ROP were estimated using odds ratios (ORs) with 95% confidence intervals (CIs). Given the limited number of type 1 ROP events and the observational nature of the study, we did not undertake multivariable modelling. All tests were two-sided and $p<0.05$ was considered statistically significant.

Results

During the 10-month study period, 222 infants underwent at least one screening examination for ROP across the four study sites ROP was identified at the first examination in 59 (26.5%) infants %), including 36(16.2%) with type 1 ROP and 23 (10.%) with type 2 ROP; A-ROP was present in 10 infants (4.5%). Fourteen infants (6.3%) did not complete study follow-up.

Among the 208 infants who completed follow-up, seventeen additional infants developed ROP during subsequent examinations. Overall, 76/208 infants (36.5%) developed ROP during follow-up (Fig. 1).

The distribution of enrolled infants and ROP outcomes varied across the four study sites (Table 1) Enrolment was highest at Eye Centre B (80/208, 38.5%). Overall, 119 infants (57.2%) were male. The mean birth weight of the cohort was 1628.1 ± 417.7 g and the mean gestational age at birth was 32.0 ± 2.4 weeks. The mean PNA at first screening was 37.47 ± 3.26 days, with variation

across centres; among infants born at less than 28 weeks of gestation the mean PNA at first screening was 34.34 ± 3.85 days. Overall, 113 infants (54.3%) underwent their first screening within 30 days of life, and the mean age at diagnosis was 39.7 ± 14.9 days.

Twenty-five infants (12.0%) had BW ≥2000 g and/or GA ≥34 weeks; three (12.0%) developed ROP, including one with type 1 disease. These cases were identified despite falling outside the principal birth-weight and gestational-age thresholds used for enrollment. Thirty-eight infants (18.3%) with both a birth weight ≥1500 g and a gestational age ≥34 weeks, five (13.2% of this subgroup; 2.4% of the cohort) developed ROP, one of whom required treatment for type 1 disease. Among the infants, 116 (55.8%) had a gestational age of ≥30 weeks or a birth weight of >1500 g, of whom 24 (20.7%) developed ROP, including 13 (11.2%) with Type 1 ROP(Fig. 2 and 3).

Comparison of infants with Type 1 ROP and those with Type 2 ROP or no ROP

Forty-six infants (22.1%) developed treatment-requiring type 1 ROP, while the remaining 162 (77.9%) had type 2 ROP or no ROP.

Infants with type 1 ROP had a significantly lower mean gestational age (31.04 ± 2.48 vs 32.83 ± 2.38 weeks, p = 0.001) and a lower mean birth weight (1424.65 ± 378.62 vs 1685.91 ± 411.21 g, p = 0.001) than infants with type 2 or no ROP. The mean postmenstrual age at first ROP screening was also significantly lower in the type 1 ROP group (36.00 ± 2.71 vs 38.19 ± 2.65 weeks, p = 0.001) (Table 2).

Infants with BW ≤1500 g had higher odds of type 1 ROP than those with BW >1500 g (OR 2.99, 95% CI 1.73–5.18; p<0.001). Among enrolled infants, type 1 ROP was more frequently observed among those screened at eye centers than NICUs (34.3% vs 10.7%). This difference is descriptive and likely reflects referral and case-selection patterns rather than an effect of screening setting Sex

and the timing of the first examination were not significantly associated with treatment-requiring ROP (Table 2).

Treatment

Of the 46 infants with type 1 ROP, 43 (93.5%) received treatment. Treatment was declined by caregivers in two infants, while one infant died before treatment could be provided. Among treated infants (n=43), 32 (74.4%) received intravitreal bevacizumab alone, three (7.0%) laser alone, six (14.0%) combined bevacizumab and laser, and two (4.7%) combined bevacizumab, laser and pars plana vitrectomy. Follow-up until ROP regression was completed in 35 (81.4%), while 4 (9.3%) died before regression was documented and 4 (9.3%) were lost to follow-up (Table 3).

Discussion

This prospective multicenter study demonstrates a substantial burden of retinopathy of prematurity (ROP) among infants screened in two level III neonatal intensive care units (NICUs) and two tertiary eye centers in Kathmandu. Among infants who completed follow-up, 76/208 (36.5%) developed ROP and 46/208 (22.1%) developed type 1 ROP. Aggressive posterior ROP (A-ROP) was also observed 14/208 (6.74%), indicating that a clinically important proportion of infants presented with severe disease. ROP was already present at the first examination in a substantial proportion of infants, including type 1 disease. In addition, ROP occurred in a small number of infants who would not have met the narrower gestational-age and birth-weight thresholds used in some international screening programs. Taken together, these findings highlight the substantial burden of ROP presenting to specialist services in Kathmandu and the need to ensure timely screening, referral and treatment.

The observed burden of ROP was higher than that reported in most previous single-centre studies from Nepal and several comparable studies from India [5–13,25–31]. Previous studies from NICUs in Nepal reported ROP in approximately 22–30% of screened infants and treatment-requiring ROP (TR-ROP) in 3.2–6.4% [10–13,25]. Similarly, Indian NICU studies using comparable screening criteria generally reported lower proportions of ROP and TR-ROP, with ROP proportion developing ROP during follow-ups of 18.5–28.6% and TR-ROP rates of 2.4–4.5% [5–8]. However, substantial variation has been reported; Hungi et al. found ROP in 41.5% and TR-ROP in 26.4% of screened infants [9]. Studies from India using different screening criteria, settings, study designs and time periods have reported ROP proportion developing ROP during follow-ups ranging from 2.3% to 25.4% and TR-ROP rates of 1.6–9.8% [26–31]. Notably, a retrospective retinal-clinic study by Padhi et al. from eastern India reported ROP in 33.2% of infants, with 25.3% requiring treatment [30]. Nevertheless, these findings should not be interpreted as a national estimate of ROP proportion developing ROP during follow-up because the participating eye centers are tertiary referral services and are likely to receive infants with a higher pre-test probability of severe disease. Rather, the study provides an estimate of the burden among infants meeting the participating centers' screening criteria and presenting within this referral network, while illustrating the spectrum of disease encountered by neonatal and specialist ophthalmic services in Kathmandu.

The variability in reported ROP proportion developing ROP during follow-up and treatment-requiring ROP (TR-ROP) across studies likely reflects differences in screened populations, referral patterns, neonatal care, screening practices, disease definitions and study design [17,31–35]. The cumulative proportion developing ROP during follow-up in the present study may overestimate the national proportion developing ROP during follow-up because the participating eye centres are

tertiary referral services receiving infants with suspected or established ROP from across Nepal; however, it provides an important estimate of the burden presenting to specialist services. The higher burden may also partly reflect improved survival of extremely premature infants in the participating level III NICUs. In the present cohort, ROP was identified more frequently among infants screened at eye centers than in NICUs (42.9% vs. 30.1%), with type 1 ROP predominating at eye centers (34.3%) and type 2 ROP among NICU-screened infants (19.4%). This difference is more likely to reflect referral and case-selection patterns than an effect of screening location itself. Among infants screened in NICUs, ROP occurred in 30.1% and TR-ROP in 10.7%, indicating a substantial burden of severe disease even within routine neonatal surveillance. Importantly, only 54.3% of infants underwent their first examination within 30 days of life, while ROP was already present at the first examination in 60/222 (27%), including type 1 ROP and A-ROP. Although this finding raises concern about delayed entry into the screening pathway, the study did not capture the timing of screening before referral for infants presenting from outside the participating hospitals and therefore cannot distinguish delayed screening or referral from early disease progression. Nevertheless, it highlights potential gaps in continuity of ROP screening and referral and supports the need to identify eligible infants before discharge, ensure screening at the appropriate postnatal or postmenstrual age, and maintain reliable follow-up through treatment or complete retinal vascularization. The substantial burden of severe ROP also underscores the importance of appropriate screening criteria in Nepal, particularly given the variation in international thresholds: UK guidance recommends screening infants with birth weight <1501 g or gestational age <31 weeks, American guidance uses birth weight ≤1500 g or gestational age ≤30 weeks with selected larger or more mature infants at increased risk, whereas Indian recommendations use broader criteria including gestational age <34 weeks and/or birth weight

<2000 g, with additional consideration of infants born at 34–36 weeks or weighing 1750–2000 g with risk factors [36-38]. Evidence from the KIDROP program further suggests that systematic screening, adherence to guidelines and improvements in neonatal care can reduce both any-stage ROP and TR-ROP [39], supporting the need for a coordinated national screening and referral program in Nepal.

In the present cohort, three infants with gestational age ≥34 weeks and/or birth weight ≥2000 g developed ROP, including one infant who developed type 1 disease. Although the number of infants outside these thresholds was small, the occurrence of treatment-requiring disease in this group is clinically important. It suggests that a screening strategy based only on narrower gestational-age and birth-weight thresholds could potentially miss some infants at risk in this setting. However, these data are insufficient to establish a new national screening threshold or to determine the sensitivity and specificity of alternative criteria.

Rather, the findings support prospective evaluation of screening criteria specifically within the Nepalese neonatal population. Such an evaluation should consider gestational age and birth weight alongside neonatal risk factors and should assess the number of infants needing to be screened, cases of type 1 ROP missed by each strategy, and the additional workload generated by broader criteria. Until such evidence is available, the present findings support maintaining a cautious approach to excluding larger or more mature infants with significant neonatal risk factors.

The severity of disease was also reflected in the treatment requirements. Most infants with type 1 ROP who were treated received intravitreal bevacizumab, either alone or in combination with laser therapy, while a smaller number underwent laser treatment alone or required surgical intervention. The predominance of anti-VEGF treatment in this cohort reflects the management approaches used

at the participating tertiary centres, particularly for severe posterior disease. The need for combined treatment or pars plana vitrectomy in a subset of infants further illustrates that some infants reached specialist services with advanced disease.

These treatment findings should, however, be interpreted primarily as a description of management within the participating centers rather than as evidence that one treatment modality is preferable. Treatment selection is influenced by disease location and severity, clinician preference, treatment availability, follow-up capacity and the clinical circumstances of individual infants. The findings nevertheless emphasize the importance of ensuring timely access to both medical and surgical treatment for infants identified with sight-threatening ROP.

Strengths and limitations

This study has several strengths. It used a prospective design with serial assessment of infants through the screening pathway and included both neonatal and specialist ophthalmic settings. Inclusion of two level III NICUs and two tertiary eye centres allowed the study to capture both infants undergoing routine neonatal screening and infants presenting through specialist referral pathways. The multicentre design also provides more contemporary evidence on the burden and clinical spectrum of ROP in Kathmandu than the predominantly single-centre studies previously reported from Nepal.

Several limitations should be considered. First, the study was conducted in tertiary and referral centres in the Kathmandu Valley, including eye centres that receive infants referred from other parts of Nepal. The observed frequency of ROP, particularly type 1 disease, may therefore be

higher than that in the wider population of eligible preterm infants in Nepal, and the findings should not be interpreted as a national proportion developing ROP during follow-up estimate.

Second, 14 infants were lost to follow-up, although the follow-up completion rate was high at 93.7%. Loss to follow-up may nevertheless have introduced bias if infants who did not complete follow-up differed systematically from those who remained under observation. In addition, the relatively short study period meant that complete retinal vascularisation could not be documented for all infants, particularly those who were referred from outside Kathmandu and could not remain locally for prolonged follow-up.

Third, the study was not designed as a comprehensive analysis of neonatal risk factors for ROP. Important exposures such as cumulative oxygen exposure, respiratory support, sepsis, transfusion, nutrition and postnatal weight gain were not examined in sufficient detail to determine their independent contribution to disease. The associations between birth weight, gestational age and type 1 ROP should therefore be interpreted as descriptive rather than causal.

Fourth, the comparison between NICU and eye-centre populations is subject to referral and selection bias. Infants presenting to tertiary eye centres are not directly comparable with infants undergoing routine NICU screening, and the higher proportion of severe disease at eye centres should not be interpreted as an effect of the screening setting.

Finally, the number of infants outside conventional screening thresholds who developed ROP was small. Although the presence of type 1 disease in one such infant is clinically important, these observations are insufficient to define optimal screening thresholds. Larger prospective studies across multiple regions of Nepal will be required to evaluate the performance and resource implications of alternative screening strategies.

Conclusions

This prospective multicentre cohort demonstrates a substantial burden of ROP and type 1 disease among infants screened in Kathmandu. ROP was present at first examination in a substantial proportion of infants, highlighting the importance of timely entry into and continuity of screening and referral pathways. A small number of infants outside commonly used gestational-age and birth-weight thresholds developed ROP, including one with type 1 disease. These findings support strengthening coordinated national ROP screening and referral systems and prospective evaluation of screening criteria tailored to the Nepalese neonatal population.

Abbreviations

AI: artificial intelligence; anti-VEGF: anti-vascular endothelial growth factor; A-ROP: aggressive posterior retinopathy of prematurity; BW: birth weight; CI: confidence interval; CRF: case report form; eCRF: electronic case report form; GA: gestational age; ICROP-3: International Classification of Retinopathy of Prematurity, third edition; ISRCTN: International Standard Randomized Controlled Trial Number; IVB: intravitreal bevacizumab; LMIC: low- and middle-income country; LSHTM: London School of Hygiene and Tropical Medicine; NHRC: Nepal Health Research Council; NICU: neonatal intensive care unit; OR: odds ratio; PMA: postmenstrual age; PNA: postnatal age; PPV: pars plana vitrectomy; ROP: retinopathy of prematurity; SD: standard deviation; SPSS: Statistical Package for the Social Sciences; STROBE: Strengthening the Reporting of Observational Studies in Epidemiology; TR-ROP: treatment-requiring retinopathy of prematurity

Declarations

Ethics approval and consent to participate

The study was approved by the Nepal Health Research Council (reference 1090). All procedures were performed in accordance with the ethical standards of the institutional research committees and with the 1964 Declaration of Helsinki and its later amendments. Written informed consent was obtained from a parent or legal guardian of every infant before enrolment.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available because they contain potentially identifiable participant-level information but are available from the corresponding author on reasonable request and subject to appropriate ethical and institutional approvals.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

SB conceptualised and designed the study, wrote the protocol, screened potentially eligible participants, coordinated data collection, analysed and interpreted the data, and wrote the original

draft. EP, PK, PS, SS, SM, RS and SA contributed to conceptualisation, data collection and critical revision of the manuscript. AV and AM contributed to conceptualisation, provided methodological feedback and critically revised the manuscript. All authors read and approved the final manuscript.

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Fig. 1 Flow of participants through screening and follow-up, with the distribution of ROP severity among the 208 infants who completed follow-up.

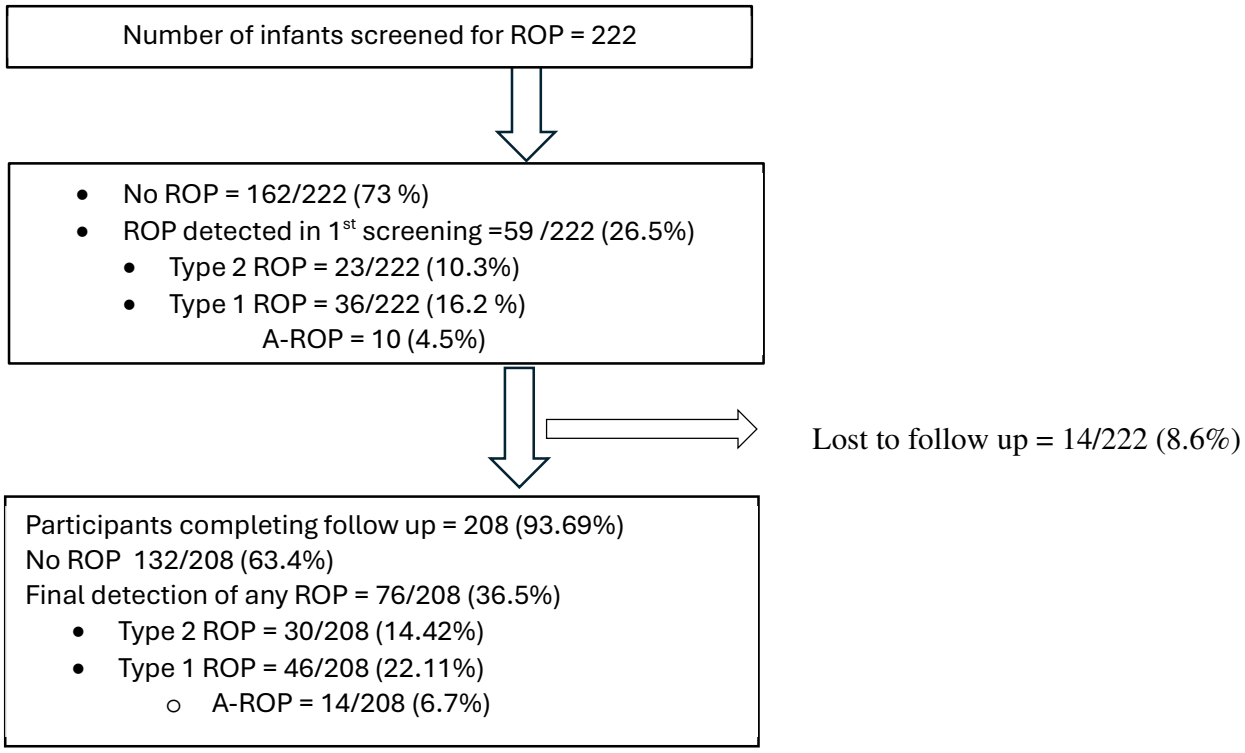


Fig.2 Distribution of All ROP by birth weight and gestational age category, showing cases occurring in infants above conventional Western screening thresholds

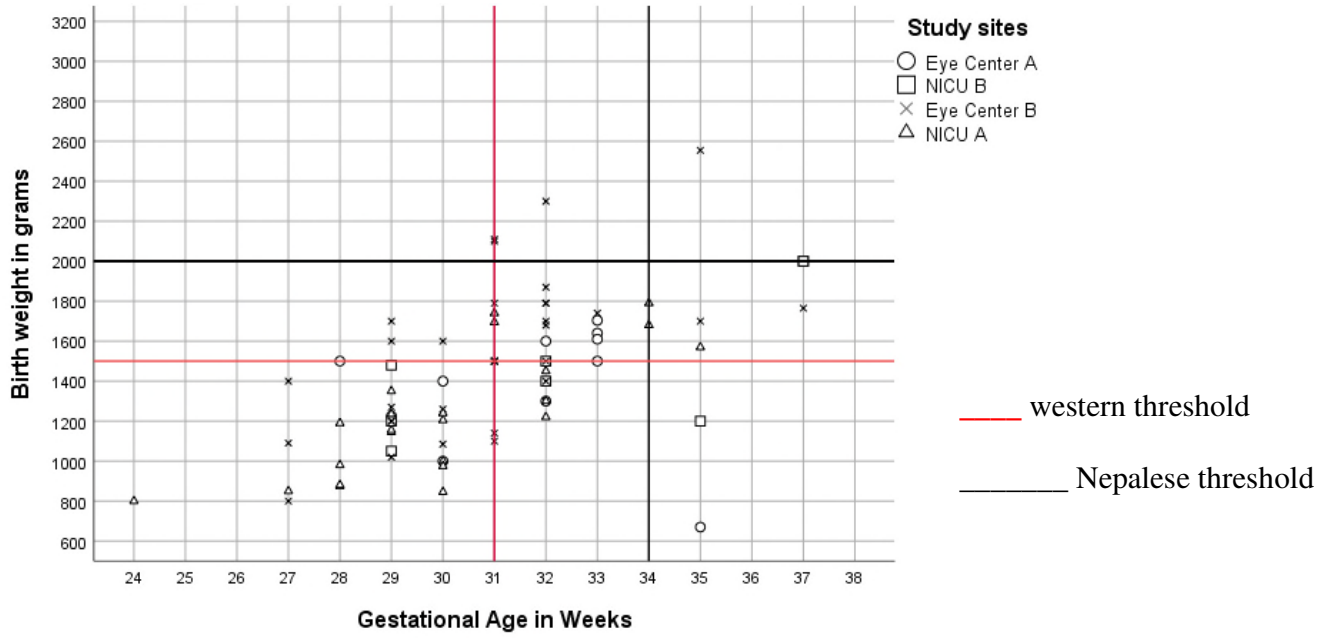


Figure 3: Distribution of TR-ROP by birth weight and gestational age category, showing cases occurring in infants above conventional Western Screening thresholds

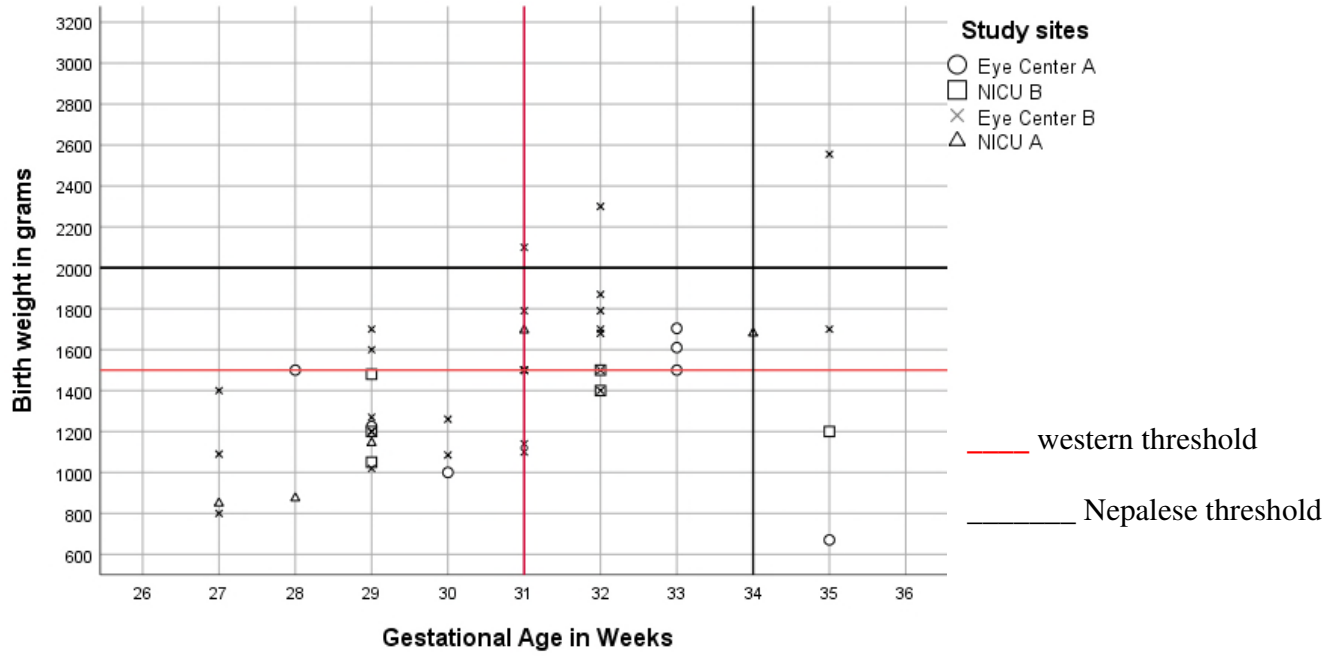


Table 1 Demographic profile of enrolled infants and ROP findings by study site

	NICU A n(%)	**NICU B n (%)**	**Eye Center A n(%)**	**Eye Center B n(%)**	**Total N (%)**
Number of newborn who underwent ROP screening only once	55 (24.8)	59(26.6)	26 (11.7)	82(36.9)	222(100)
Number of newborn completed follow up	51(24.51%)	52 (25%)	25(12.02%)	80 (38.46%)	208 (100)
Sex: Male Female	 27 24	 33 19	 10 15	 49 31	 119 (57.22) 89 (42.78)
Birth weight in grams (mean±SD)	1419 ±434.2	1812.15 ±386.20	1707.56±456.42	1611.00±351.16	1628.12±417.72
Gestational age at birth in weeks (mean±SD)	30.80± 2.32	33.61±2.17	32.27±1.74	31.70±2.29	32.03±2.43
PNA at first examination (mean± SD) days	35.56±2.52	38.28±2.14	37.37±2.87	38.18±3.88	37.47±3.26
PNA at first examination for newborn with PMA at birth <28 weeks (mean± SD) in days	n = 3 30.76± 1.81	n =0	n = 0	n = 4 37.04±2.22	N= 7 34.34±3.85
Examined within 30 days of life N (%)	29 (13.94)	42 (20.19)	12 (5.76)	22 (10.57)	113 (54.32)

Age of life at the time of diagnosis (mean± SD) in days	39.16± 14.88	37.60± 3.90	37.36±9.03	42.10± 22.04	39.68±14.89
No ROP	28 (13.47)	44 (21.16)	15 (7.21)	46 (22.11)	132 (63.5)
ROP Type 1 ROP Type 2 Total ROP N=number (%)	5 (2.40) 18 (8.65) 23 (11.05%)	6 (2.80) 2 (0.97) 8 (3.8%)	7 (3.33) 4 (1.93) 11 (5.29%)	28 (13.46) 6 (2.89) 34 (16.3%)	46 (22.11) 30 (14.4) 76 (36.53%)

Table 2 Comparison of characteristics between infants with type 1 ROP and those with type 2 ROP or no ROP

		Type 1(TR ROP) n(%) 46 (22.11)	**Type 2 or No ROP n(%) 162 (77.9)**	**OR (95% CI)**	**p-value**
Mean Gestational age ± SD		31.04 ± 2.48	32.83 ± 2.38		0.001
Mean Birth weight		1424.65 ± 378.62	1685.91± 411.21		0.001
Mean PMA age (week) at the time of 1st screening for ROP ± SD		36± 2.71	38.19± 2.65		0.001
Gestational age	≤28 weeks	6	12	1.58 (0.77-3.21)	0.23
	>28weeks	40	150		
Birth weight	≤ 1.5kg	31	54	2.99 (1.73-5.18)	0.0001
	>1.5kg	15	108		
Sex	Male	28	91	0.86(0.51-1.45)	0.32
	Female	18	71		
Timing of 1st examination	≤30days	24	79	1.11 (0.66-1.85)	0.68
	>30days	22	83		
Hospital settings	Eye center	35	70	3.12 (1.67-5.80)	0.001
	NICU	11	92		

Table 3 Treatment modalities and outcomes among infants with type 1 ROP (n = 46)

Treatment	All treated type 1 ROP (43)	All treated A-ROP (13)
Bevacizumab alone	32 (74.4%)	9 (69.23%)
Laser alone	3 (7.0%)	0
Bevacizumab + laser	6 (14.0%)	4 (30.76%)
Bevacizumab + laser + PPV	2 (4.7%)	0