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Study Of Retinopathy Of Prematurity In Neonates.

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ABSTRACT

Retinopathy of Prematurity (ROP) is a significant concern in neonatal care, particularly among premature infants. This study aimed to investigate the incidence, characteristics, and associated factors of ROP in neonates within a Tertiary Rural Health Care Centre. A prospective observational study was conducted over a two-year period (September 2019 to August 2021). The study included 134 neonates meeting specific selection criteria, with 32 neonates developing ROP. Data were analyzed concerning gender, gestational age, retinal zones, and associations with respiratory distress syndrome (RDS) and surfactant administration. ROP incidence was 23.88%, with most neonates falling into stage 2 (56.25%) and stage 1 (37.50%). There was no statistically significant difference in ROP incidence between genders. Gestational age-wise, neonates born in the 31–32-week range were most susceptible. ROP distribution across retinal zones indicated a progression towards more central areas as ROP advanced. Notably, there was a significant association between RDS and ROP ($p < 0.0008$), with 38.88% of neonates with RDS developing ROP. Additionally, surfactant administration was significantly associated with ROP ($p = 0.00001$), with 46.96% of neonates receiving surfactant developing ROP. This study underscores the importance of early ROP screening and intervention, especially for neonates with lower gestational age, RDS, and those receiving surfactant. Awareness of these risk factors and patterns of ROP development is vital for informed clinical practice, ultimately improving neonatal care and reducing the risk of vision impairment. Further research is needed to refine screening and treatment protocols.

Keywords: Retinopathy of Prematurity, neonates, ROP incidence, risk factors, surfactant administration.

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INTRODUCTION

Retinopathy of Prematurity (ROP) is a critical and potentially blinding eye disorder that primarily affects premature infants [1]. The introduction of this study explores the significance of ROP in neonatal care and its implications for public health. Premature birth rates continue to rise, making ROP a growing concern for neonatal healthcare providers and researchers. ROP occurs when the blood vessels in the developing retina of premature infants do not fully mature, leading to abnormal vessel growth and potential retinal detachment, which can result in permanent vision impairment or blindness. Understanding the risk factors, pathogenesis, and current diagnostic and treatment strategies for ROP is essential in providing timely and effective interventions to prevent visual impairment in affected neonates [2-4]. This study aims to contribute to the broader body of knowledge on ROP by investigating its prevalence, risk factors, and the effectiveness of available treatments, ultimately enhancing our ability to mitigate the impact of this condition on premature infants' vision and overall quality of life.

MATERIAL AND METHODS

Our study was a prospective observational study and was conducted at a Tertiary Rural Health Care Centre over duration of 2 years, from September 2019 to August 2021. The study population comprised all neonates admitted to the neonatal intensive care unit of the healthcare center during an 18-month period, specifically from 1st November 2019 to 30th April 2021. The sample size for the study consisted of neonates who met the predetermined selection criteria during the study period.

The inclusion criteria for the study encompassed infants with a birth weight of 2,000 grams or less and those born at or before 34 weeks of gestation. Additionally, neonates with birth weights greater than 2,000 grams or gestational ages exceeding 34 weeks were included if they met specific medical conditions such as requiring cardio-respiratory support, surfactant administration, blood transfusion, neonatal sepsis, neonatal seizures, respiratory distress syndrome, congenital abnormalities (e.g., tracheoesophageal fistula, atrial septal defect, ventricular septal defect, patent ductus arteriosus, imperforated anus, or any other malformations), or those diagnosed with retinopathy of prematurity.

Exclusion criteria consisted of neonates with neonatal jaundice, neonates with birth weights exceeding 2,500 grams and not diagnosed with respiratory distress syndrome, and those whose guardians or caregivers were not willing to participate in the study.

The methodology involved the use of various study instruments, including a torch light, pediatric lid speculum, dilating drops (Tropicamide 0.5% and Phenylephrine 2.5%), topical anesthetic eye drops (Paracain eye drops), antibiotic eye drops, an indirect ophthalmoscope with a +20-diopter lens and scleral depressor, a fundus camera (RETCAM), an electronic weighing machine, sterile cotton, and ROP documentation forms. Data collection and examinations were conducted according to the specified criteria and with the consent of caregivers or guardians of the neonates, ensuring ethical considerations were upheld throughout the study.

RESULTS

Total 141 neonates were included in study; 7 neonates were excluded from study. Further study done on 134 neonates.

In our study males 18 (24.65%) and 14 (22.95%) among the females developed retinopathy of prematurity. There was no statistical significance difference of ROP with gender.

A total of 32 of 134 neonates developed Retinopathy of prematurity thus the incidence was 23.88 %. 12(37.50%) of the 32 neonates were in stage 1, 18(56.25%) were in stage 2, 1(3.12%) was in stage 3 and 1(3.12%) was AROP stage.

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Table 1: Stage wise distribution of ROP with Gestational age

Stageof ROP	Gestational Age in weeks								
	<28		29-30		31-32		33-34		Total
	Number of patients	%	Numberof patients	%	Number of patients	%	Number of patients	%	
1	3	25%	3	25%	5	41.66%	1	8%	12
2	1	5%	4	22.22%	12	66.66%	1	5%	18
3	0	0%	0	0%	1	100%	0	0%	1
4a	0	0%	0	0%	0	0%	0	0%	0
4b	0	0%	0	0%	0	0%	0	0%	0
5	0	0%	0	0%	0	0%	0	0%	0
AROP	0	0%	1	100%	0	0%	0	0%	1

Out of 12 neonates of stage 1 ROP,3 was of gestational age <28 wks., 3 were of 29- 30 wks. 5 were of 33-34 wks. Out of 18 stage 2 ROP 1 neonate was of gestational age <28 wks., 4 were of 29-30 wks., 12 were of 31-32 wks., 1 was of 33-34 wks. gestational age. 1 neonate of stage 3 was of 31-32 wks. and 1 neonate of stage AROP was of 29-30 wks. gestational age.

Table 2: Stagewise distribution of zones of ROP

ROP pattern		No of patients	%	Total
Stage 1	Zone 1	0	0%	12
	zone 2	6	50%	
	zone 3	6	50%	
Stage 2	zone 1	3	16.66%	18
	zone 2	14	77.77%	
	zone 3	1	5%	
Stage 3	Zone 1	0	0%	1
	zone 2	1	100%	
	Zone 3	0	0%	
AROP	Zone 1	0	0%	1
	zone 2	1	100%	
	Zone 3	0	0%	

Out of 12 stage 1 ROP neonates, 6 were in zone 2 and 6 were in zone 3. Out of 18 stage 2 ROP neonates, 3 were in zone 1, 14 were in zone 2 and 1 neonate was in zone 3. Stage 3 and AROP stage neonates were in zone 2.

Table 3: Relation of RDS and ROP

RDS	ROP present		ROP absent		Total
	Number of patients	%	Number of patients	%	
Present	21	38.88%	33	61.11%	54
Absent	11	13.75%	69	86.25%	80

$\chi 2 = 11.20$, df =1, $p < 0.0008$

Of the total 54 neonates who developed RDS, 21(38.88%) neonates developed ROP while of the 80 neonates without RDS, 11(13.75%) developed ROP. There is statistical significance association of neonates with RDS and ROP.

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Table 4: Relation of Surfactant and ROP

Surfactant	ROP present		ROP absent		Total
	Number of patients	%	Number of patients	%	
Given	31	46.96%	35	53.03%	66
Not given	1	0.01%	67	98.52%	68

$\chi 2 = 38.14$, df =1, p =0.00001

DISCUSSION

The study's findings provide valuable insights into the incidence and characteristics of Retinopathy of Prematurity (ROP) among neonates in a Tertiary Rural Health Care Centre. In this discussion, we will delve into the implications of the study's results and their relevance to clinical practice and neonatal care. We will also consider the association of ROP with various factors such as gender, gestational age, zones of ROP, and the presence of respiratory distress syndrome (RDS) and surfactant administration [5, 6].

The study revealed an incidence of ROP in 23.88% of the neonates, with the majority falling into stage 2 (56.25%) and a lower percentage in stage 1 (37.50%). These findings underscore the importance of early screening and intervention to prevent the progression of ROP, as more advanced stages can lead to severe vision impairment or blindness. It is noteworthy that the incidence of ROP in this population is relatively high, emphasizing the need for diligent monitoring and care in neonatal units, especially for preterm infants [7, 8].

Regarding the distribution of ROP by gender, the study observed that both males and females were affected, with 24.65% of males and 22.95% of females developing ROP. Importantly, there was no statistically significant difference between the genders in terms of ROP incidence. This finding suggests that gender does not play a significant role in ROP development in this neonatal population. However, other risk factors and clinical considerations must be evaluated to determine the underlying causes of ROP in this cohort [9].

The study also explored the relationship between gestational age and the stage of ROP. Notably, the majority of neonates with stage 1 ROP fell into the 31–32-week gestational age range, whereas stage 2 ROP was more evenly distributed across various gestational age groups, with the highest number in the 31–32-week range. These results highlight the vulnerability of preterm neonates, especially those born in the 31–32-week gestational range, to the development of ROP. Understanding the specific gestational age groups at higher risk can aid healthcare providers in tailoring their screening and intervention protocols to mitigate ROP in these neonates effectively.

The study also examined the distribution of ROP within different zones of the retina. Stage 1 ROP was predominantly observed in zones 2 and 3, indicating that ROP in its early stages often affects the peripheral zones of the retina. In contrast, stage 2 ROP was more evenly distributed across zones 1 and 2, with one neonate in zone 3. This suggests that as ROP progresses, it may extend to more central areas of the retina. Stage 3 and AROP were primarily found in zone 2. Understanding the zone-wise distribution of ROP is crucial for ophthalmologists and neonatal care teams, as it influences the decision to initiate treatment.

The study also examined the association between RDS and ROP. The results revealed that neonates with RDS were significantly more likely to develop ROP (38.88%) compared to neonates without RDS (13.75%). This association was found to be statistically significant. RDS is a common complication in preterm neonates, and its relationship with ROP has been well-documented. The study's findings reaffirm the importance of proactive ROP screening in neonates with RDS and highlight the need for early interventions to prevent ROP development in this at-risk group.

Another critical factor examined in the study was the administration of surfactant. Surfactant is often given to preterm neonates to improve lung function and reduce the risk of RDS. The study showed that neonates who received surfactant had a higher incidence of ROP (46.96%) compared to those who did not (0.01%). This association was found to be statistically significant. While surfactant is beneficial for

lung function, its use may lead to a higher risk of ROP. This finding underscores the need for vigilant ROP screening and management in neonates who receive surfactant, as early intervention may be necessary to prevent severe ROP.

CONCLUSION

In conclusion, this study provides valuable insights into the incidence and characteristics of ROP in a population of neonates in a Tertiary Rural Health Care Centre. The results emphasize the need for diligent ROP screening and management, particularly for preterm neonates, those with RDS, and those receiving surfactant. Understanding the risk factors and distribution of ROP across gestational age and retinal zones is essential for guiding clinical practice and improving outcomes for neonates at risk of ROP. These findings can inform healthcare providers and ophthalmologists in their efforts to prevent and treat this potentially blinding condition, ultimately enhancing the quality of care and outcomes for neonates in neonatal intensive care units. Further research is warranted to explore additional factors that may contribute to the development of ROP in this population and to refine screening and treatment protocols.

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