EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Coden USA: EJBPBO
Volume: 13
Issue: 8
Year: 2026

RETINOPATHY OF PREMATURITY IN PREMATURE INFANTS ADMITTED AT NICU

Dr. Rajendra Rai*

India.

***Corresponding Author: Dr. Rajendra Rai**

India.

DOI: https://doi.org/10.5281/zenodo.21884288

How to cite this Article: Dr. Rajendra Rai*. (2026). Retinopathy of Prematurity In Premature Infants Admitted At Nicu. European Journal of Biomedical and Pharmaceutical Sciences, 13(8), 340–349.

Article Received on 15/07/2026 **Article Revised on 05/08/2026** **Article Published on 10/08/2026**

ABSTRACT

Background: Retinopathy of prematurity is a leading cause of preventable childhood blindness in middle-income countries and the developed world. Retinopathy of prematurity (ROP) is a major complication of preterm birth. The etiology of ROP appears to be multifactorial and complex. Identification of post natal factors that affect the risk for and the course of retinopathy of prematurity might allow neonatologists and ophthalmologists to attempt to prevent the disease and to limit comorbidities with which it shares modifiable risk factors. **Materials and Methods:** The data were retrieved retrospectively from medical record section and reviewed. Premature infants admitted in NICU over a period of 2 years were determined for retinopathy of prematurity (ROP). Data were analyzed by using Medcalc statistical software version 15.8 in the computation of the test statistics. **Results:** In our study, a total number of patients who had ROP screening was 50, out of them 16(32%) had ROP findings. Out of 16 ROP cases, 7(43.75%) had stage I ROP, 7(43.75%) had stage II ROP, 1(6.25%) had stage III ROP and 1(6.25%) had stage V ROP. Results showed that only few are significantly affecting the occurrence of retinopathy of prematurity of patient. Specifically, results showed that apnea (p=0.008), RDS (p=0.029), blood transfusion (p=0.015), mechanical ventilator (p=0.019) and oxygen support (p=0.058) have significant effect on outcome of ROP in premature patients. All the other variables turn out to be not significant. **Conclusion:** Apnea, RDS, blood transfusion, and use of mechanical ventilator and oxygen therapy were risk factor in the patients with ROP. This study reaffirmed that the development of retinopathy is multifactorial. Therefore, a high index of suspicion, appropriate screening, prompt diagnosis and early treatment will prevent the progression of ROP to blindness.

KEYWORDS: Retinopathy of Prematurity, Prematurity, Risk factors.

INTRODUCTION

Retrolental fibroplasia in premature newborns was first reported by Terry, et al. in 1942. Subsequent studies identified oxygen therapy as the main cause of this complication and the condition was renamed as Retinopathy Of Prematurity (ROP) by Health in 1942.[1]

The world prevalence of blindness due to ROP is approximately 70,000[1]. Retinopathy of prematurity is a leading cause of preventable childhood blindness in middle-income countries[2] and remains a significant cause of blindness in the developed world. Incidence of severe retinopathy of prematurity in Europe; Austria 16.0%, Belgium 19.8-25.5%, Germany 14.8-19.5% and United Kingdom 5.2%.[3] Incidence of severe ROP in Asia; Singapore 8.0%, China 1.3% - 13.1%, India 10.2% - 11.0%, Pakistan 20.6%, Vietnam 9.3% and Bangladesh 4.4%.[4] Incidence of Retinopathy of Prematurity in Philippines, total number of reported cases till date is 142.[5] It is one of the leading causes of blindness in infants <=1500 g in the United States (US), with an estimated 500 infants blinded yearly and another 4500 infants with serious retinal scars.[6]

Retinopathy of prematurity (ROP) is a major complication of preterm birth. It encompasses a spectrum of pathologies that affect vision, from mild disease that resolves spontaneously to severe disease that causes retinal detachment and subsequent blindness. The pathologies are characterized by an arrest in normal retinal vascular development associated with microvascular degeneration. The resulting ischemia and retinal hypoxia lead to excessive abnormal compensatory blood vessel growth. However, this neovascularization

can lead to fibrous scar formation and culminate in retinal detachment.[7]

The etiology of ROP appears to be multifactorial and complex. Prematurity with a gestational age <32 weeks and low birth weight (LBW) <=1500 g are two of the known risk factors.[6] Every year, an estimated 15 million babies are born preterm (before 37 completed weeks of gestation), and this number is rising.[8] Most studies report ROP incidences that are about 60% for babies less than 1500 g.[9] Where advanced care in neonatal intensive care units is available, most cases of retinopathy of prematurity occur in extremely low-gestational-age neonates (gestational age of less than 28 weeks at birth). The low concentrations of factors important for development that are normally provided in utero prevent the very immature retinas of extremely preterm infants from vascularising normally, which can precipitate the disease, possibly with different effects during different developmental stages.

Identification of post natal factors that affect the risk for and the course of retinopathy of prematurity might allow neonatologists and ophthalmologists to attempt to prevent the disease and to limit comorbidities with which it shares modifiable risk factors.[10]

Significance of the study

1. It will provide local data on retinopathy of prematurity in premature infant patient.
2. It will provide the incidence of retinopathy of prematurity in NICU patients at Rizal Medical Center.
3. It will provide the information of risk factors involved in patient with retinopathy of prematurity.
4. It will provide the information which can be used by health care professionals to attempt to prevent the retinopathy of prematurity and to limit co morbidities.
5. It will provide data which can be used to formulate protocol for early detection of retinopathy of prematurity and to limit co morbidities.

REVIEW OF LITERATURE

Definition

1. Retinopathy of prematurity (ROP) is a complex disease of the developing retinal vasculature in premature infants.[11]

2. Retinopathy of prematurity is a vasoproliferative disorder affecting the retina of premature babies.[12}

Pathogenesis

The basic pathogenesis of ROP is still unknown.
Beginning at 16 weeks of gestation, retinal angiogenesis normally proceeds from the optic disc to the periphery, reaching the outer rim of the retina (oraserrata) nasally at about 36 week and extending temporally by approximately 40 week. Injury to this process results in various pathologic and clinical changes. The first observation in the acute phase is cessation of vasculogenesis. Rather than a gradual transition from vascularized to avascular retina, there is an abrupt termination of the vessels, marked by a line in the retina. The line may then grow into a ridge composed of mesenchymal and endothelial cells. Cell division and differentiation may later resume, and vascularization of the retina may proceed. Alternatively, there may be progression to an abnormal proliferation of vessels out of the plane of the retina, into the vitreous, and over the surface of the retina. Cicatrization and traction on the retina may follow, leading to retinal detachment.[11]

The risk factors associated with ROP are not fully known, but prematurity and the associated retinal immaturity at birth represent the major factors. Oxygenation, respiratory distress, apnea, bradycardia, heart disease, infection, hypercarbia, acidosis, anemia, and the need for transfusion are thought by some to be contributory factors. Generally, the lower the gestational age, the lower the birthweight, and the sicker the infant are, the greater the risk is for ROP.[11]

Classifications[12]

Stage	
Immature retina	No retinopathy of prematurity
Stage 1	Demarcation line
Stage 2	Ridge
Stage 3	Extraretinal fibrovascular proliferation
Stage 4a	Partial retinal detachment (extrafoveal)
Stage 4b	Partial retinal detachment (foveal)
Stage 5	Total retinal detachment

Zone	
Zone I	The innermost zone consists of a circle, the radius of which extends from the center of the optic disc to twice the distance from the center of the optic disc to the center of the macula.
Zone II	Extends centrifugally from the edge of zone I to the nasal oraserrata (at the 3 O'clock position in the right eye and 9 O'clock position in the left eye).
Zone III	Zone III is the residual cresent of retina anterior to zone II.

Plus Disease	
No Plus	No arterial tortuosity and venous dilation,
Pre-Plus	Vascular abnormalities of the posterior pole that are insufficient for the diagnosis of plus disease but that demonstrate more arterial tortuosity and more venous dilatation than normal.
Plus	Sufficient vascular dilatation and tortuosity present in at least 2 quadrants of the eye.

Screening and follow up

The American Academy of Pediatrics and American Academy of Ophthalmology currently recommend ROP screening for infants with following[12],

1. Birth weight of<= 1500 g;
2. Gestational age of 30 week or less;
3. Selected infants with a birth weight between 1500 and 2000 g or gestational age >30 weeks with an unstable clinical course, including those requiring cardiorespiratory support; and
4. Who are believed by their attending pediatrician or neonatologist to be at high risk for retinopathy of prematurity.

The Philippine Society of Pediatric Ophthalmology and strabismus recommends comprehensive ophthalmologic examination for the following:

Premature infants at risk for Retinopathy of Prematurity

1. Age of Gestation <32 weeks
2. Low birth weight <1500 g
3. Infant weighing 1500 to 2000 g with a stormy medical course

It is recommended by the Philippine Academy of Ophthalmology-Retinopathy of Prematurity Working Group that the first examination be performed at 2 weeks post-natal age or at 32 weeks post-conceptional age, whichever come earlier.[12] It is recommended that a pediatric ophthalmologist, retina specialist, or any general ophthalmologist with sufficient knowledge and experience to identify accurately the location and sequential retinal changes in ROP, perform ROP screening in preterm infants.[12]

Recommended follow up[12]

1 week or less	Immature retina, zone I Immature retina at zone II posterior, near boundary of zone I Stage 1 or 2 ROP, zone I Stage 3 ROP, zone II Presence or suspected APROP
1-2 week	Immature retina, posterior zone II Stage 2 ROP, zone II Unequivocally regressing ROP, zone I
2 week	Stage 1 ROP, zone II
	Immature retina, zone II
	Unequivocally regressing ROP, zone II
2-3 weeks	Stage 1 or 2 ROP, zone III Regressing ROP, zone III

Treatment

Treatments available are:

1. Laser therapy
2. Cryotherapy
3. Retinal attachment

Prevention

Prevention of ROP ultimately depends on prevention of premature birth and its attendant problems.[11]

Definition of terms

A. **Retinopathy of prematurity**

1. Retinopathy of prematurity (ROP) is a complex disease of the developing retinal vasculature in premature infants.[11]
2. Retinopathy of prematurity is a vasoproliferative disorder affecting the retina of premature babies.[12]

B. Preterm[8]

Preterm is defined as babies born alive before 37 weeks of pregnancy are completed.

There are sub-categories of preterm birth, based on gestational age:

1. Extremely preterm (<28 weeks)
2. Very preterm (28 to <32 weeks)
3. Moderate to late preterm (32 to <37 weeks)

C. Birth weight classification[13]

1. Normal birth weight: 2500 g to 4000 g
2. Low birth weight: 1500 g to <2500 g
3. Very low birth weight: 1000 g to <1500 g
4. Extremely low birth weight: <1000 g

Local studies

Comparison of the incidence of retinopathy of prematurity from population-based studies is difficult because of substantial variability in study designs, gestational ages of included infants, survival rates, and treatments used. Study done at Santo Tomas University Hospital found that Twenty-six infants (54.2 percent) were ROP positive while 22 infants (45.8 percent) were ROP negative. The mean age of gestation of infants with ROP was 30.6 weeks while the mean birth weight was 1.01 kg. Nine infants (34.6 percent) had stage I ROP, 9 (34.6 percent) had stage II and eight (30.8 percent) had stage III. Plus disease was present in seven infants. Four patients had Stage II plus disease while 3 patients had stage Ill plus disease.[14] There were other studies done locally with different finding in incidence but all the studies done showed that the risk factor were quite similar. The risk factor involved were; prematurity, very low birth weight, sepsis, oxygen therapy, respiratory distress syndrome, blood transfusion.[14,15,16, 17]

OBJECTIVE

General Objective

To determine the various personal and clinical factors related to Retinopathy of Prematurity in premature patient admitted at NICU at Rizal Medical Center.

Specific objectives

1. To determine the incidence of retinopathy of prematurity in patient admitted at NICU at Rizal Medical Center.
2. To determine the risk factors for retinopathy of prematurity in patient admitted at NICU at Rizal Medical Center.
3. To find the severity of retinopathy of prematurity in patient admitted at NICU at Rizal Medical Center.

RESEARCH DESIGN AND METHODOLOGY

Research Method

1. Study design: Retrospective, descriptive study.
2. Study population: All the preterm patients who were admitted to NICU from September 2013 to September 2015 were included in this study.
3. Inclusion criteria

A. Patient with following criteria[12]

i. Age of gestation <32 weeks upon delivery.

ii. Low birth weight <1500 grams upon delivery.

iii. Infants weighing 1500 to 2000 grams with a stormy medical course.

iv. Retinopathy of Prematurity screening examination was performed at 2 weeks post-natal age or at 32 weeks post-conceptional age, whichever comes earlier.

v. The ROP screening examination was done by the pediatric ophthalmologist or retina specialist.

4. Exclusion criteria

A. Premature infant with congenital problem was not included in the study.

Review of medical records

The review of medical records was done by the principal investigator in medical record section of Rizal Medical Center, where all the charts of discharged patients are maintained. The final diagnosis at discharge with case number is recorded in database of medical record section.

Data extraction

The following medical information were extracted from the charts, namely; gender, birth weight, gestational age, delivery type, APGAR score at 1 and 5 minutes, resuscitation required at birth.

Complications such as sepsis, apnea, pneumonia, RDS, NEC were recorded. Management required namely use of mechanical ventilator, inotropes used, blood transfusion required, and oxygen therapy requirement were recorded.

Maternal complications during pregnancy were likewise recorded.

Data analysis

Descriptive statistics specifically mean, standard deviation and percentage were used to present the patients profile characteristics. Moreover, in indentifying the incidence of ROP, proportion with 95% confidence interval was utilized. Lastly, in determining significant factors in the occurrence of ROP, binary logistic regression was used. Medcalc statistical software version 15.8 was used in the computation of the test statistics.

RESULTS AND DISCUSSION

Results

4.1 Personal Characteristics

Characteristics	N (%)
Sex	
Male	24 (48.0)
Female	26 (52.0)
Birth Weight (kg), mean ±	1.4 ± 0.2
Birth Weight (groups)	
Low (1.5kg to 2.5kg)	17 (34.0)
Very Low Birth weight (1kg to <1.5kg)	32 (64.0)
Extremely Low birth weight <1kg)	1 (2.0)

Gestational Age, mean ± SD	32.4 ± 1.9
Extremely Preterm (<28 weeks)	1 (2.0)
Very Preterm (28 to <32 weeks)	18 (36.0)
Late Preterm (32 to <37 weeks)	31 (62.0)
Delivery Type, N, %	
CS	21 (42.0)
NSD	28 (56.0)
OFE	1 (2.0)
Plurality	
Single	45 (90.0)
Twin	5 (10.0)
APGAR Score in 1 min, mean ± SD	7.0 ± 1.5
APGAR Score in 1 min (group)	
<7	10 (20.0)
≥7	40 (80.0)
APGAR Score in 5 min, mean ± SD	8.2 ± 1.2
APGAR Score in 5 min (group)	
<7	4 (8.0)
≥7	46 (92.0)
Resuscitation Required	
Yes	5 (10.0)
No	45 (90.0)

This table shows the personal characteristics of patients upon delivery. There is no significant difference in regards to sex of patients. Most of the patients were delivered by normal spontaneous delivery as singleton with average APGAR score of 7.0 ± 1.5 and 8.2 ± 1.2 at 1 and 5 minutes respectively. Only 5 patients required resuscitation upon delivery. Patients had average birth weight of 1.4 ± 0.2 kg and age of gestation of 32.4 ± 1.9 weeks.

4.2 Clinical Characteristics

Characteristics	N (%)
Sepsis Probable	
Yes	48 (96.0)
No	2 (4.0)
Sepsis Culture Positive	
Yes	12 (24.0)
No	38 (76.0)
Apnea	
Yes	15 (30.0)
No	35 (70.0)
Pneumonia	
Yes	15 (30.0)
No	35 (70.0)
RDS	
Yes	7 (14.0)
No	43 (86.0)
Necrotising Enterocolitis	
Yes	0 (0.0)
No	50 (100.0)
Oxygen Support	
<5 Days	27 (54.0)
>5 Days	18 (36.0)
None	5 (1.0)
Mechanical Ventilator	
Yes	6 (12.0)
No	44 (88.0)
Inotropes	
Yes	0 (0.0)

No	50 (100.0)
Blood Transfusion	
Yes	16 (32.0)
No	34 (68.0)

Result showed that 48 out of 50 patients had probable sepsis, with culture positive in 12 patients. Pneumonia and RDS was observed in 15 and 7 patients respectively. During hospital stay, 18 patients required oxygen therapy for more than 5 days and 16 of them requiring blood transfusion. None of the patients had necrotizing enterocolitis and inotropes was not required in any patients.

4.3 Maternal Complications

Maternal Comorbidities	n (%)
Hypertension	14 (28.0)
UTI	7 (14.0)
Goiter	1 (2.0)
None	30 (60.0)

This table shows that 30 mothers did not have any comorbidities during delivery. Out of them, 14 mothers had hypertension during delivery. Similarly 7 and 1 mother had urinary tract infection and goiter respectively.

4.4 Incidence of retinopathy of prematurity

Number of Patients with ROP	% of Patients with ROP	95% Confidence Interval
16	32.00	19.9% to 46.8%

Results show that the incidence of retinopathy of prematurity in patients admitted at the NICU at RMC is 32%. Moreover, 95% confident that the true incidence of retinopathy of prematurity will fall from 19.9% to 46.8%.

4.5 Severity of retinopathy of prematurity

Severity of ROP	N (%)
Stage I	7 (43.75)
Stage II	7 (43.75)
Stage III	1 (6.25)
Stage IV	0 (0.0)
Stage V	1 (6.25)

In terms of severity of ROP, results show that among patients with ROP, most of them have either stage 1 (43.75%) or stage II (43.75%) severity. Moreover, it can be seen that 1 patient has 3rd stage and another 1 stage 5 level of severity.

4.6 Risk factors for retinopathy of prematurity

Possible Risk Factors	Odds Ratio	95% Odds Ratio	*p value
Gender (Male)	**1.629**	**0.492 to 5.393**	**0.425**
Birth Weight (kg)	0.547	0.041 to 7.243	0.647
Gestational Age	1.033	0.753 to 1.416	0.842
Delivery (CS)	1.615	0.487 to 5.361	0.433
Plurality (Twin)	0.500	0.051 to 4.875	0.551
APGAR 1minute	1.267	0.779 to 2.062	0.340
APGAR 5 minutes	1.480	0.783 to 2.798	0.228
Resuscitation	0.500	0.051 to 4.875	0.551
Sepsis Probable	-	-	0.996
Sepsis Culture Positive	2.800	0.731 to 10.718	0.133
Apnea	***6.000***	***1.596 to 22.552***	***0.008***
Pneumonia	1.667	0.470 to 5.916	0.429
RDS	***7.273***	***1.230 to 43.005***	***0.029***
Necrotizing Enterocolitis	0.000	-	0.995
Mechanical Ventilator	***15.000***	***1.576 to 142.730***	***0.019***
Intropes	-	-	-

Blood Transfusion	***4.959***	***1.364 to 18.034***	***0.015***
Oxygen Support (>=5)	***3.500***	***0.959 to 12.778***	***0.058***
Maternal Comorbidities	1.256	0.376 to 4.196	0.711

*Binary Logistic Regression

Results showed that only few personal and clinical factors are significantly affecting the occurrence of retinopathy of prematurity in premature patients. Specifically, results showed that apnea (p=0.008), RDS (p=0.029), blood transfusion (p=0.015), mechanical ventilator (p=0.019) and oxygen support (p=0.058) would increase the odds ratio for retinopathy of prematurity. Moreover, results showed that those with apnea are 6 times more likely to acquire ROP as compared to those without apnea. Likewise, those with RDS are 7.273 times more likely to have ROP. Furthermore, resulting odds ratio suggest that those who have a blood transfusion are 4.959 times more likely to have ROP. Lastly, those with 5 or above days of oxygen support are more likely to have ROP. All the other variables turn out to be not significant.

4.7 Birth weight and gestational age of neonates with and without ROP

Characteristic	No ROP	With ROP	Total
Birth weight (gram)			
<1000	-	1(2%)	1(2%)
1000 to <1500	22(44%)	**10(20%)**	**32(64%)**
1500 to <2500	12(24%)	5(10%)	17(34%)
Total	34(64%)	16(32%)	50(100%)
Gestational Age (weeks)			
<28	-	1(2%)	1(2%)
28 to <32	12(24%)	6(12%)	18(36%)
32 to <37	22(44%)	**9(18%)**	**31(62%)**
Total	34(68%)	16(32%)	50(100%)

Table 4.7, shows the distribution of the study patients on the basis of birth weight and age of gestation. Total of 32(64%) patients had birth weight between 1000 to <1500 g (very low birth weight) similarly 31(62%) had age of gestation between 32 to <37 weeks (late preterm). Out of them, patients who had Retinopathy Of Prematurity, 10(20%) and 9(18%) had very low birth weight and were late preterm respectively.

DISCUSSION

There was total number of 320 premature patients admitted at NICU during the study period from September 2013 to September 2015. Out of these 320, 50(15.6%) patients met the criteria for Retinopathy of Prematurity screening hence was referred to Ophthalmology Department for assessment and screening. Out of these 50 patients screened, 16(32%) had ROP findings. Risk factors identified that significantly affected the occurrence of ROP were apnea, RDS, blood transfusion, mechanical ventilator and oxygen therapy use of more than 5 days.

In this research, risk factors were divided into 4 categories;
(1) Patients profile upon delivery
(2) Complication in patient during management
(3) Management required for the patient
(4) Maternal complication during pregnancy.

Incidence of Retinopathy of Prematurity

Comparisons of the incidence of retinopathy of prematurity from population based studies is difficult because of substantial variability in study designs, gestational ages of included infants, survival rates, and treatments used. In this study, a total of 50 patients had ROP screening, out of these 16(32%) had ROP findings, as compared to incidence of 54.2% from University of Santo Tomas[14],11.6% from Cebu Doctors Hospital[16], 43.39 % from De La Salle University Medical Center[15], 18.75% from Jose R. Reyes Memorial Medical Center.[18]

Severity of Retinopathy of prematurity

This study showed that out of 16 ROP cases, 7(43.75%) had stage I ROP, 7(43.75%), had stage II ROP, 1(6.25%) had stage III ROP and 1(6.25%) had stage V ROP. All the patients with ROP stage I and II were on observation and most of them had resolution on subsequent follow up and some are still on observation. The patient with ROP stage III had laser treatment and Patient with ROP stage V, which was only in one eye, other one had immature retina and was on close follow up.

Based on the Table 4.1 patients profile was identified. There is no significance on variation of sex; male was 48% and female 52%. Most of the patients were delivered as singleton (90%) and by normal spontaneous delivery (56%). Upon delivery, first minute APGAR score given has a mean of 7+/-1.5 and at 5 minutes, a mean of 8.2+/-1.2 and only 10% of the total patients required resuscitation upon delivery. According to a

study by Shah, et al, APGAR score < 5 ± 2 was named as one of the risk factors and in another study by De Mauro, et al, resuscitation at birth was noticed as another risk factor for ROP[1]. Contrary to these studies, this study did not show association of APGAR score and resuscitation as a risk factor.

Birth weight upon delivery ranged from 900 g to 1.9 kg, with mean weight of 1.4+/-0.2 kg. Total of 32 (64%) was in the range of very low birth weight (1000 to <1500 g). Gestational age was based upon Ballard scoring and maternal last menstrual period (LMP), ranged from 27 weeks to 36 weeks with a mean age of 32.4+/-1.9 weeks. But total of 32 patients, which accounted 64% of the total was under late preterm (32 to <37 weeks) category and 31(62%) had very low birth weight. Out of them, patients with Retinopathy Of Prematurity, 11(22%) had birth weight <1500 g and 9(18%) were late preterm respectively. In this study these risk factors did not have significant association with the ROP occurrence in the patient. To confirm this finding further prospective study should be done.

This study has shown that premature patients with respiratory distress syndrome (RDS) have significantly higher risk to develop ROP then without RDS. Similarly RDS as a risk factor for ROP was also found in study done by Banzon, et al.[14]

Several studies have shown a relationship between oxygen administration and its association with the development of ROP.[6,19] This study also showed that patient receiving oxygen therapy more than 5 days, is at higher risk of having ROP.

Blood transfusion has been recognized as increasing the risk of ROP in newborns; this effect has been attributed to increased delivery of oxygen, iron, and free radicals of oxygen to the retina.[20,21] Similar to this study, in Gerona, et al[16], study transfusion of blood was associated with an increased risk of ROP.

This study have shown that the prevalence of ROP rise sharply in premature patients who were intubated and placed in ventilator. Similarly mechanical ventilator as a risk factor for ROP was also found in the study done by Nafarrete, et al.[22]

This study shows that patient with apnea have 6 times higher risk of developing ROP compared to patient without apnea. This finding of apnea as risk factor was also found in study done by Zhonghua Yi Xue Za Zhi.[23]

The study that was done at De La Salle Health Sciences Institute[15], found maternal co-morbidities as a risk factor for ROP, in contrary to that study, this study show no significant affect in the outcome. In this study maternal co-morbidities assessed were hypertension, urinary tract infection and thyroid problem.

Other risk factors; culture positive sepsis, pneumonia did not have any risk association with the outcome.

None of the patients under this study have necrotizing enterocolitis and inotrope was not used, so its association with the outcome of ROP could not be evaluated. So further studies will be needed to find whether they are risk factors are not.

Limitations of the study

This study included only those patients who were admitted at NICU from September2013 to September 2015. ROP screening was done only on those patients who were able to fulfill the criteria of the Philippine Society of Pediatric Ophthalmologic and Strabismus recommendations. Most of the patients were unable to meet the requirement for ROP screening, which would create a bias in the analysis of the results.

CONCLUSION

Retinopathy of prematurity is a leading cause of preventable childhood blindness in middle-income countries and developed world. ROP is a major complication of preterm birth with multifactorial and complex etiology.

In this study total of 50 patients were screened, out of them 16 had ROP with a prevalence of 32%. Among them 7 patients had ROP stage I and 7 patients had stage II and 1 patient stage V ROP, who were on close follow up. Most of them had spontaneous regression. Patients having stage III received laser therapy. This study indicates that apnea, respiratory distress syndrome, blood transfusion, and use of mechanical ventilator and oxygen therapy more than 5 days were major risk factors for development of ROP in premature patients. Therefore, complication such as apnea and RDS should be properly managed and management associated with high risk, should be used with precaution in an attempt to prevent ROP and limit comorbidities.

Therefore, a high index of suspicion, appropriate screening, prompt diagnosis and early treatment will prevent the progression of ROP to blindness.

Recommendation

We recommend that prospective studies should be conducted involving larger population to identify the risk factors involved in Retinopathy of Prematurity in premature infants.

This study showed that apnea, RDS, blood transfusion, use of mechanical ventilation and oxygen therapy involves the risk of having Retinopathy of Prematurity. Therefore, these factors should be considered while managing premature patients.

Retinopathy of Prematurity is a preventable cause of blindness, so proper screening, early diagnosis and

management can prevent the incidence of ROP and its comorbidities.

Appendix A
PATIENT DATA COLLECTION FORM
Name
Date of Admission
Patient profile upon delivery

Characteristics	
1. Sex	
2. Birth Weight	
3. Gestational age	
4. Delivery type	
5. Plurality	
6. APGAR score	
a. At 1 minute	
b. At 5 minute	
7. Resuscitation required	

Complication in patient during Management

Characteristics	
1. Sepsis	
a. Probable sepsis	
b. Culture positive sepsis	
2. Apnea	
3. Pneumonia	
4. Respiratory Distress Syndrome	
5. NecrotisingEnterocolitis	

Management required for the patient

Characteristics	
1. Duration of oxygen therapy	
a. None or <5 days	
b. >5 days	
2. Mechanical Ventillation	
a. Yes	
b. No	
3. Inotropes Support	
a. Yes	
b. No	
4. Blood transfusion	
a. Yes	
b. No	

Maternal factor

Characteristics	**Condition**
Maternal Comorbidities	

REFERENCES

1. Sabzehei MK, et al. Afjeh SA, et al. Dastjani Farahani A, et al. Shamshiri AR, et al. Esmaili F, et al. Retinopathy of prematurity: Incidence, risk factors, and outcome. Arch Iran Med., 2013; 16(9): 507–512.
2. Gilbert C, et al. Retinopathy of prematurity: a global perspective of the epidemics, population of babies at risk and implications for control, Feb. 2008; 84(2): 77-82. doi: 10.1016/j.earlhumdev.2007.11.009. Epub 2008 Jan 29.
3. Data Collection method. (n.d). Retrieved from http://www.aao.org/topic-detail/retinopathy-of-prematurity--europe
4. Data Collection method. (n.d). Retrieved from http://www.aao.org/topic-detail/retinopathy-of-prematurity--asia-pacific
5. Data Collection method. (n.d), Retrieved from http://www.pps.org.ph/index.php?option=com_content&view=article&id=20&Itemid=33.
6. Christina G, et al. Anderson, MD, et al. William E. Benitz, MD, et al. Ashima Madan, MD, et al. Retinopathy of Prematurity and Pulse Oximetry: A National Survey of Recent Practices Journal of Perinatology, 2004; 24: 164–168.
7. Retinopathy of prematurity: understanding ischemic retinal vasculopathies at an extreme of life. The Journal of Clinical Investigation http://www.jci.org, September, 2010; 120: 9.
8. Data Collection method. (n.d), Retrieved from WHO preterm birth. http://www.who.int/mediacentre/factsheets/fs363/en/
9. Zin A, et al. Gole GA, et al. Retinopathy of prematurity-incidence today, Jun. 2013; 40(2): 185-200. doi: 10.1016/j.clp.2013.02.001.
10. Ann Hellström, et al. Lois E H Smith, et al, Olaf Dammann, et al. Retinopathy of Prematurity, Lancet, 2013; 382: 1445–57. Published Online June 17, 2013 http://dx.doi.org/10.1016/ S0140-6736(13)60178-6
11. Nelson Textbook of Pediatrics, Twentieth Edition, Chapter 630, Disorder of the Retina and Vitreous.
12. Philipp J Ophthalmol, 2015; 40: 57-61.
13. Manual of Neonatal Care, Lippincott, Williams and Wilkins, Seventh edition, Chapter 7, The High-Risk Newborn: Anticipation, Evaluation, Management, and Outcome.
14. Marcelino D. Banzon, Emilio A. Hernandez, Maria Angela N. Oconer, Noreen Maria Regina Ocampo, Retinopathy of prematurity at the University of Santo Tomas Hospital: A 5-year experience. Source Document: Santo Tomas Journal of Medicine, October 2002; 51(4): 79-85. (Journal)
15. Data Collection method. (n.d). Retrieved from http://www.herdin.ph/index.php/component/herdin/?view=research&cid=51697
16. Glinda A. Gerona, et. al. Retinopathy of prematurity in low birth weight infants: Cebu Doctors Hospital 1994-1997. Source Document : Cebu Doctors' Proceedings, January 1997; 13(1): 111-116. (Journal)
17. Herma Grace S. Cerdana, et. al. Chona S. Liao, et. at. Emilio L. Macias, et. al. Source Document :Philippine Journal of Ophthalmology, July 2010; 35(2): 56-60. (Journal)
18. Herma Grace S. Cerdana, et al, Chona S. Liao, et al Emilio L. Macias, et al Source Document: Philippine Journal of Ophthalmology, *July 2010; 35(2): 56-60. Journal)* http://www.herdin.ph/index.php/component/herdin/?view=research&cid=39193

19. Bedrossian RH, Carmichael P, Ritter A. Retinopathy of prematurity (retrolental fibroplasia) and oxygen: part 1. Clinical study: part II. Further observations on the disease. Am J Ophthalmol, 1954; 37: 78–86.
20. Hirano K, Morinobu T, Kim H, Hiroi M, Ban R, Ogawa S, et al. Blood transfusion increases radical promoting nontransferrin bound iron in preterm infants. Archives of disease in childhood. *Fetal and Neonatal Edition*, 2001; 84: F188–F193.
21. Gaynon MW, Stevenson DK, Sunshine P, Fleisher BE, Landers MB. Supplemental oxygen may decrease progression of prethreshold disease to retinopathy of prematurity. *Journal of Perinatology*, 1997; 17: 434–438.
22. Patrizia Nafarrete, et al, Alvina Pauline D. Santiago, et al, Gloria B Ramirez, et al, Sheilla Ann D. Masangkay, et al, Retinopathy of prematurity: clinical correlates, diagnosis, management and treatment outcomes. Source Document: Journal of the Perinatal Association of the Philippines, June 2005; 9(1): 13-27. (Journal)
23. Zhonghua Yi Xue Za Zhi. Evaluation of risk factors for retinopathy of prematurity, Jul. 5, 2011; 91(25): 1749-52.
24. Emmeline R. Mina-Alvarez,et al, Ricardo H. Ventura, et al, Outcomes of retinopathy of prematurity screening at a tertiary government hospital.Source Document :Philippine Journal of Ophthalmology, July 2013; 38(2): 109-113. (Journal).