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# RETINOPATHY OF PREMATURITY (ROP);

## ASSOCIATION WITH RISK FACTORS OF RETINOPATHY OF PREMATURITY (ROP) OF IN-HOSPITAL NEWBORNS OF LOW BIRTH WEIGHT (LBW) IN TERTIARY CARE HOSPITAL.

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**ABSTRACT… Objectives:** To find out Association with risk factors of retinopathy of prematurity (ROP) of in-hospital newborns of low birth weight (LBW). **Study Design:** Cross sectional study. **Setting:** Department of Paediatrics, Civil Hospital Bahawalpur. **Period:** March 2017 to May 2018. **Material and Methods:** Sixty infants having birth weight 800 gram to 2500 gram, gestational age from 28 weeks to 40 weeks, either male or female were selected. Retinopathy of prematurity (ROP) was assessed in selected patients. **Results:** Mean gestational age was 32.67 ± 3.8 weeks, mean weight was 1484.17 ± 532.9 gram and mean duration of hospital stay was 14.52 ± 6.6 days. ROP was noted in 20 (33%) patients. Grade I ROP was noted in 11 (55%) patients followed by grade II 7 (35%) and grade III in 2 (10%) patients. Very low birth weight (VLBW), longer duration of oxygen supplementation and male gender were found to be significantly associated (p value < 0.05) with ROP while other variables turned out to be insignificant. **Conclusion:** Association and risk factors of ROP in LBW infants is high and most of the cases were found with grade I ROP. ROP developed in all very premature infants. Significant association of ROP was noted with VLBW, prolonged duration of oxygen supplementation and male gender.

**Key words:** Oxygen Supplementation, Prematurity, Retinopathy, Retinopathy of prematurity (ROP), Risk Factors.

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## INTRODUCTION

Retinopathy of prematurity (ROP) is characterized as a vasoproliferative disorder of the eye affecting preterm infants which can progress to visual impairment or blindness.[1] Recent developments in neonatal care have enhanced outcome for prematures,[2] but ROP has also increased in parallel.[3] ROP is a major contributor to pediatric blindness globally. WHO's Vision 2020 program has also highlighted this view.[4]

Some risk factors have been found to be associated with ROP but 3 most common which have been most consistently linked are known to be low gestational age, low birth weight (LBW) and lengthened exposure to supplementary oxygen following delivery.[5] Mechanical ventilation, sepsis intraventricular haemorrhage, anaemia, blood transfusions, apnoea, male gender and poor postnatal weight gain have also been linked with ROP.[5,6] Difficult to label that whether these factors are actual predictors of ROP or if they reflect the severity of illness.[6]

Lots of work has been done around the world to know the incidence and features of ROP present in their own populations.[7] Pakistan being a developing country with poor health indicators is ranked 6 in the world in terms of population. More than half the population resides in rural areas.[6] Specialized setting and high quality intensive care is not possible in remote areas of the country. Neonatal mortality for the prematures in remote areas is high and ROP is not posing that much threat in terms of blindness there.

Neonatal care is much better in urban areas of Pakistan and it considered that ROP will turn out to be a mjor contributor to childhood blindness. So, this study is being done to know the frequency of ROP in premature infants at our institution and to note the risk factors linked with ROP.

## Material and Methods

This cross sectional study was conducted at Department of Paediatrics, Civil Hospital Bahawalpur from March 2017 to May 2018.

A total of 60 babies having birth weight 800 gram to 2500 gram, gestational age from 28 weeks to 40 weeks, either male or female were selected. Weight of the patients was measured by using digital weighing machine. Gestational age was estimated according to maternal history, obstetric ultrasounography, if taken during the first trimester of pregnancy and was confirmed by physical examination of the newborns themselves. ROP and its staging was defined according to the International ROP classification.[8]

SPSS version 17 was used for data analsis. Mean and SD were calculated for categorical data like gestational age, Duration of oxygen supplementation (hours), Oxygen concentration (%), Weight (grams) and Duration of hospital stay (days). Frequencies were calculated for ROP and gender. Stratification was done for gestational age, gender, duration of oxygen supplementation (hours), Oxygen concentration (%), Weight (grams) and duration of hospital stay (days). Post stratification chi-square test was applied to seen the effect of these on study variable which is ROP. P value ≤ 0.05 was taken as statistically significant.

## RESULTS

Total 60 patients were included in this study. Mean gestational age of the patients was 32.67 ± 3.8 weeks, mean weight was 1484.17 ± 532.9 gram and mean duration of hospital stay was 14.52 ± 6.6 days.

ROP was noted in 20 (33%) patients. (Figure-1) Out of these 20 patients with ROP, grade I ROP was noted in 11 (55%) patients followed by grade II 7 (35%) and grade III in 2 (10%) patients. (Figure-2).

Four categories were made according to the gestational age i.e. very premature (VPT), moderate premature (MPT), late premature (LPT) and term. In VPT group, there were 31 (51.7%) patients followed by at term 11 (18.3%), MPT 9 (15%) and LPT 9 (15%). ROP was noted only in VPT group i.e. 20 (100%) patients whereas in MPT group, LPT group and term group, no patient found with ROP. Statistically significant association of ROP with gestational age (VPT) was noted with a significant p value < 0.001. (Table-I)

There were 29 (48.3%) male and 31 (51.7%) female. ROP was noted in 11 (55.0%) male patients and 9 (45.0%) female patients. Gender came up with significance association with ROP with a p value of 0.019. (Table-I)

Patients were divided into two groups according to duration of oxygen supplementation i.e. <10 hours and ≥10 hours. In <10 hours group, there were 27 (45.0%) patients and ≥10 group, there were 33 (55.0%) patients. ROP was found in 5 (25.0%) patients and 15 (75.0%) patients respectively in <10 hours group and ≥10 hours group. Statistically significant (P = 0.032) association of ROP with duration of oxygen supplementation was found. (Table-I)

Patients were divided into two groups according to oxygen concentration i.e. ≤60% concentration group and >60% group. In ≤60% concentration group, there were 19 (31.7%) patients and in >60% concentration group there were 41 (68.3%) patients. ROP was noted in 8 (40.0%) patients and 12 (60.0%) patients respectively in both groups. An insignificant association of ROP with oxygen concentration was found with p value 0.384. (Table-I)

Three weight categories were made i.e. 1500-2500 gram group, 1000-1500 gram group and <1000 gram group. There were 25 (41.7%) patients, 13 (21.7%) patients and 22 (36.7%) patients respectively in 3 weight category groups. ROP was not noted in 1500-2500 gram group and was noted in 4 (20.0%) patients and 16 (80.0%) patients respectively in 1000-1500 gram group and <1000 gram group. Statistically significant (P < 0.001) association of ROP with weight of the patients was noted. (Table-I)

Total 41 (68.3%) patients were found with 1-16 days duration of hospital stay and 19 (31.7%) patients found with 17-28 days of hospital stay. ROP was noted in 12 (60.0%) patients and 8 (40.0%) patients and no association (P = 0.384) of ROP with duration of hospital stay was noted. (Table-I)

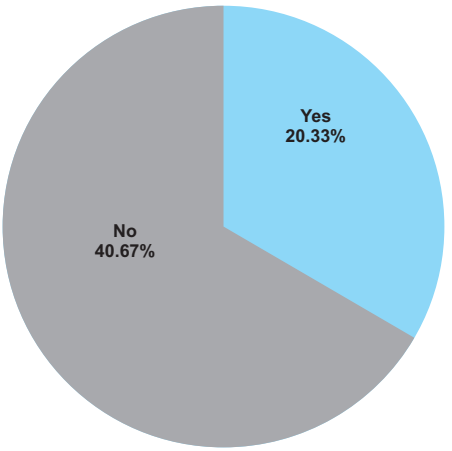


Figure-1. Overall frequency of ROP

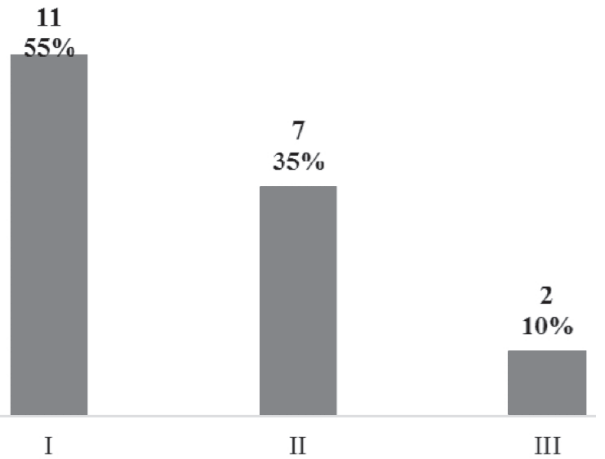


Figure-2. Grades of ROP (N = 20)

## DISCUSSION

ROP, which was formerly known as retrolental fibroplasia, is a disorder of proliferative retinopathy of premature and LBW infants with the extent of the immaturity of the retina depending mainly on the degree of prematurity at birth.[9]

| Risk Factor | ROP | | Total (n=60) | P-value |
|---|---|---|---|---|
| | Yes (n=20) | No (n=40) | | |
| **Gestational Age(weeks)** | | | | |
| VPT | 20 (100%) | 11 (27.5%) | 31 (51.7%) | < 0.001 |
| MPT | 0 | 9 (22.5%) | 9 (15.0%) | |
| LPT | 0 | 9 (22.5%) | 9 (15.0%) | |
| Term | 0 | 11 (27.5%) | 11 (18.3%) | |
| **Gender** | | | | |
| Male | 11 (55.0%) | 18 (45.0%) | 29(48.3%) | 0.019 |
| Female | 9 (45.0%) | 22 (55.0%) | 31 (51.7%) | |
| **Duration of Oxygen Supplementation (Hours)** | | | | |
| <10 | 5 (25.0%) | 22 (55.0%) | 27 (45.0%) | 0.032 |
| ≥10 | 15 (75.0%) | 18 (45.0%) | 33 (55.0%) | |
| **Oxygen Concentration (%)** | | | | |
| ≤60% | 8 (40.0%) | 11 (27.5%) | 19 (31.7%) | 0.384 |
| >60% | 12 (60.0%) | 29 (72.5%) | 41 (68.3%) | |
| **Weight (Grams)** | | | | |
| 1500-2500 | 0 | 25 (62.5%) | 25 (41.7%) | <0.001 |
| 1000-1500 | 4 (20.0%) | 9 (22.5%) | 13 (21.7%) | |
| <1000 | 16 (80.0%) | 6 (15.0%) | 22 (36.7%) | |
| **Duration of Hospital Stay (Days)** | | | | |
| 1-16 | 12 (60.0%) | 29 (72.5%) | 41 (68.3%) | 0.384 |
| 17-28 | 8 (40.0%) | 11 (27.5%) | 19 (31.7%) | |

Table-I. Association of ROP with different risk factors

It is very important that at-risk preterm infants should receive timely retinal examinations before the extent of ROP becomes permanently destructive.[10]

Oxygen therapy has been related to increased risk of ROP in preterm infants. However, ROP can occur even with careful control of oxygen therapy.[11] RDS originated by developmental insufficiency of surfactant creation along with lung's structural immaturity are mojor problems related with preterm birth. Infants with greater RDS would be at higher risk for ROP due to prolonged oxygen use.[12]

Findings of this study was in agreement with the study by Lermann et al,[13] who reported ROP in premature infants as 27.2%. ROP was found in half of the patients with weights below 1 kg and 72% newborns of less than 28 weeks gestational age. Reisner et al.[14] studied 1,070 newborn infants, observing a 20% prevalence of ROP among newborn infants weighing less than 2,500 g, 21% for those below 1,500 g, 35% for weights under 1,250 g and 72% for babies born weighing less than 1,000 g. Threshold disease was noted in 9% of the newborns weighing < 1,500 g.

In 1991, Charles and colleagues reported ROP in 72% among newborn infants weighing < 1,200 gram and of 66% for newborns < 32 weeks gestational age.[15]

Purohit and colleagues studied 3,025 newborn infants in a multicenter study in the USA from 1979 to 1981 and found a prevalence of ROP of 11% for weights below 1,750 g and 43% for birth weights below 750 g.[16] Hussain et al.[17] studied 950 newborn infants and observed an ROP prevalence of 21.3% and 4.6% of Stage 3 or higher ROP. Larsson et al. reported prevalence rate of ROP as 25.5%.[18]

## CONCLUSION

Association and risk factors of ROP in LBW infants is high and most of the cases were found with grade I ROP. ROP developed in all very premature infants. Significant association of ROP was noted with VLBW, prolonged duration of oxygen supplementation and male gender.

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The **reward** of **suffering** is experience.

*"Harry S Truman"*

## AUTHORSHIP AND CONTRIBUTION DECLARATION

| Sr. # | Author-s Full Name | Contribution to the paper | Author=s Signature |
|---|---|---|---|
| 1 | Muhammad Asghar Ali | Study planning and designing, manuscript writing and data collection. | |
| 2 | Muhammad Anwar | Supervise research work, editing and proof reading of the manuscript and study planning. | |
| 3 | Malik M. Naeem | Data entry, Data analysis, Data collection and manuscript editing. | |