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A Medical College (Medinirai Medical College and Hospital, Palamu, Jharkhand) Based Observational Study to Assess Retinopathy of Prematurity: A Clinico-Epidemiological Study

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Abstract
The aim of the present study was to assess the prevalence of retinopathy of prematurity and to determine its risk factors. Over the course of two years, patients who visited the outpatient department (OPD) at the hospital were the subjects of this prospective research. The research covered all infants born at a gestational age of fewer than 28 weeks who weighed less than 2000 gms. 21 (36%) of 60 mothers were 31-32 weeks pregnant. 18 (30%) mothers finished 30-31 weeks, 10 (16%) completed 29-30 weeks, 6 (10%) completed 28-29 weeks and 5 (8%) completed fewer than 28 weeks. This research found that 100% of ROP newborns received oxygen supplementation, highlighting its relevance as a risk factor. 5 (41.66%) of 12 patients had stage II ROP, 4 (3.333%) had stage I, 2 (16.66%) had stage III, 1 (8.33%) had stage IV and no had stage V. Six of the 12 ROP-positive newborns got sepsis, whereas six did not. Out of 12 ROP-positive newborns, 10 developed RDS and 2 did not, indicating a strong positive correlation between ROP and RDS. Ten of the 12 ROP-positive newborns had undergone blood transfusions, whereas just two did not, indicating a strong link between ROP and blood transfusions. A significant correlation was seen between a familial history of ROP and the occurrence of ROP in infants included in the study highlighting preterm labour history. Nevertheless, additional investigation is required via extensive multicentre investigations in order to get insight into potential genetic predisposition.

INTRODUCTION

Retinopathy of prematurity (ROP) is a significant contributor to avoidable visual impairment in children[1].At the Royal Blind School of Edinburgh, it is estimated that up to 10% of childhood blindness is attributed to this condition. Additionally, it is claimed that this condition accounts for 6-18% of juvenile blindness in developed nations[2].Recent breakthroughs in neonatal care during the last decade have significantly improved the survival rates of preterm newborns[3].As a result, the occurrence of ROP has also risen proportionally. ROP is continuously being studied epidemiologically worldwide[4].Timely detection of retinal impairment and the implementation of suitable therapy may avoid blindness and promote enhanced overall development in children[5].Retinopathy of prematurity (ROP) is defined by the presence of aberrant neovascularization in the retina of preterm newborns. These atypical blood vessels are delicate and have the potential to release fluid or hemorrhage, resulting in the formation of scar tissue on the retina and its displacement. This results in a tractional retinal detachment, which is the primary cause of visual impairment and blindness in ROP[6].The stages of retinopathy of prematurity (ROP) are defined by the ophthalmoscopic observations at the boundary between the vascularized and avascular regions of the retina. Stage 1 is characterized by a faint demarcation line, stage 2 by an elevated ridge, stage 3 by the presence of extraretinal fibrovascular tissue, stage 4 by a subtotal retinal detachment and stage 5 by a complete retinal detachment. Furthermore, Plus disease, characterized by notable enlargement and twisting of the blood vessels at the back of the eye, may be noticed at any stage and is indicative of heightened blood circulation in the retina[7].Early screening of newborn children at risk for developing retinopathy of prematurity (ROP) is crucial in order to prevent severe problems that may lead to blindness[8].Several risk factors are linked to the development of retinopathy of prematurity (ROP), including preterm, low birth weight and extended oxygen therapy[9].Retinopathy of prematurity is categorized into five stages. Stage 1 is distinguished by a faint demarcation line, stage 2 by an elevated ridge, stage 3 by the presence of extraretinal fibrovascular tissue, stage 4 by a partial detachment of the retina, and stage 5 by a complete detachment of the retina. Plus, disease is defined by an elevation in the winding of small arteries, together with swelling of veins in the blood vessels located in the back of the eye[10].The visual outcomes of patients have improved with early intervention with laser photocoagulation and medication with anti-VEGF (vascular endothelial growth factor)[11].

The objective of this research was to evaluate the frequency of retinopathy of prematurity and identify the variables that contribute to its occurrence.

MATERIALS AND METHODS

This research was done in a hospital setting, with a focus on patients who visited the outpatient department (OPD) during a two-year period. There were 50 infants that underwent screening for ROP. The research covered all infants with a birth weight below 2000 grams and a gestational age below 28 weeks. The research excluded infants who had congenital malformations, chromosomal abnormalities, or inborn errors of metabolism.

Before screening and definitive examination, the study was explained in detail to all the participants (parents). Written consent was obtained from allthe parents of the participating infants).

After explaining the study to all the participants (parents) in detail written consent was obtained from all the participants. Detailed history was taken from parents including mechanical ventilation, apnoea, sepsis, intraventricular haemorrhage, surfactant therapy, anaemia, frequent blood transfusions, multiple birth, pulmonary insufficiency among others and documentation was done in the proforma.

The pupils of the babies were dilated using tropicamide 0.5% and phenylephrine 2.5% (after dilution). Topical anaesthetic (paracaine) was instilled and a paediatric wire speculum was applied. The fundus examination was carried out using indirect ophthalmoscope and with 20D lens and the grading for the severity (stages) and location (zones) was done. The babies were called for follow up depending upon the severity of ROP.

Statistical Analysis: Data was entered in Excel and analysed using SPSS software version 21 and was summarised using mean and SD. Appropriate tests of statistical significance such as chi-quare, test and paired t-test were used.

RESULTS AND DISCUSSIONS

21 (36%) mothers out of 60 were completed 31-32 weeks of gestational age. 18 (30%) mothers had completed 30-31 weeks of gestation, 10 (16%) mothers had completed 29-30 weeks of gestation, 6(10%) mothers had completed 28-29 weeks and 5 (8%) mothers had completed less than 28 weeks of gestation.

100% babies diagnosed with ROP in this study had been subjected to oxygen supplementation which signifies the importance of oxygen supplementation as a risk factor for ROP.

Fig 1: ROP examination of baby

Table 1: Gestational age of mothers

Gestational age	N	Percentage
Less than 28 weeks	5	8
28-29 weeks	6	10
29-30 weeks	10	16
30-31 weeks	18	30
31-32 weeks	21	36

Table 2: Association between ROP an oxygen supplementation

ROP/O2Supply	Present	Absent	Total
No	0	30	30
Yes	12	8	20
Total	12	38	50

Table 3: Staging in ROP positive babies

Staging in ROP	N	Percentage
Stage I	4	33.33
Stage II	5	41.66
Stage III	2	16.66
Stage IV	2	8.33
Stage V	0	0

Table 4: Association between ROP and sepsis

ROP/H/Osepsis	Present	Absent	Total
No	6	36	42
Yes	6	2	8
Total	12	38	50

Table 5: Association between ROP and RDS

ROP/H/ORDS	Present	Absent	Total
No	2	26	28
Yes	10	12	22
Total	12	38	50

Table 6: Association between ROP and Blood transfusion

ROP/H/OTransfusion	Present	Absent	Total
No	2	25	27
Yes	10	13	23
Total	12	38	50

5 (41.66%) subjects out of 12 were having stage II ROP, 4 (3.333%) subjects with stage I ROP, 2 (16.66%) subjects had stage III ROP, 1 (8.33%) subject had stage IV ROP and no subject had stage V ROP.

Out of the 12 ROP positive babies, 6 babies had developed sepsis whereas 6 babies did not develop sepsis.

Out of the 12 ROP positive babies, 10 babies had history of RDS whereas only 2 babies did not have history of RDS showing a very high positive co-relation between ROP and RDS.

Out of the 12 ROP positive babies, 10 babies had history of blood transfusion whereas only 2 babies did not have history of blood transfusions showing a very high association between ROP and blood transfusion.

Retinopathy of prematurity (ROP) occurs in preterm newborns due to inadequate development of retinal blood vessels. In ROP, similar to retinopathies such as sickle cell retinopathy and proliferative diabetic retinopathy, oxygen plays a significant role. The occurrence of ROP is inversely correlated with both gestational age and birth weight. Elevated levels of oxygen may lead to vasoconstriction of the retina. Research has shown that maintaining a low level of oxygen saturation may effectively prevent the progression of ROP.The incidence of ROP in western areas varies from 21-65.8%[12]. Studies conducted in India have shown that the prevalence of ROP (Retinopathy of Prematurity) in infants with low-birth-weight ranges from 38-51.9%[13,14]. ROP is a complex condition that is influenced by several causes. The occurrence of ROP may be influenced by factors such as low-gestational age, low-birth weight, sepsis, oxygen treatment, respiratory distress syndrome and blood transfusion[15].Low-gestational age and low-birth weight have been identified as the most important risk factors for the development of ROP, as shown in several studies[16].Out of a total of 60 mothers, 21 of them, which accounts for 36% of the total, finished 31-32 weeks of gestational age. Out of the total number of mothers, 18 (30%) had reached the gestation period of 30-31 weeks, 10 (16%) had reached 29-30 weeks, 6 (10%) had reached 28-29 weeks and 5 (8%) had reached fewer than 28 weeks of gestation. All newborns diagnosed with ROP in this research had received oxygen supplementation, indicating that oxygen supplementation is a significant risk factor for ROP. Out of the 12 individuals, 5 (41.66%) had stage II ROP, 4 (3.333%) had stage I ROP, 2 (16.66%) had stage III ROP, 1 (8.33%) had stage IV ROP and none had stage V ROP. Regarding the impact of short gestational age on the incidence of ROP, we have identified it as the most significant risk factor for ROP. This finding is consistent with the findings of research conducted by Shah[17], Karna[18] and Fortes[19]. The greater vulnerability of the retina to oxidative damage and many prenatal variables, such as hyper and hypoxia, blood transfusions and sepsis, may be attributed to the immaturity of vascularization. We observed a lack of significant correlation between gestational age and the severity of ROP. However, our findings contradict previous research[17] which demonstrated a substantial association between lower gestational age and severe ROP.

Among the 12 babies who tested positive for retinopathy of prematurity (ROP), 6 babies had sepsis whereas the other 6 babies did not. Among the 12

newborns that tested positive for ROP, 10 had a previous diagnosis of RDS, whereas just 2 did not. This indicates a strong positive correlation between ROP and RDS. Among the 12 infants that tested positive for ROP, 10 had a documented history of receiving blood transfusions, whereas only 2 infants did not have such a history. This indicates a strong correlation between ROP and blood transfusion. In their research of 60 patients, Gupta[20] discovered a notable correlation between retinopathy of prematurity (ROP) and factors such as high oxygen need, sepsis, apnea, respiratory distress syndrome (RDS) and low birth weight. Vinekar[21] and Rekha[22] showed a similar substantial connection between ROP and RDS in children weighing more than 1250gms. They concluded that risk factors for ROP include age less than 32 weeks, anaemia, apnea, transfusions and oxygen exposure.

CONCLUSION

A strong association was seen between the presence of a family history of ROP and the occurrence of ROP in the patients included in the study. Nevertheless, additional investigation of this correlation is necessary via extensive multicentre investigations, which may provide insights into potential genetic predisposition.

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