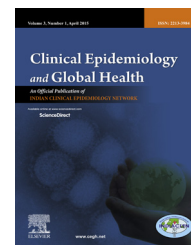


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Original article

Risk factors of retinopathy of prematurity in a tertiary care hospital in South India

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ABSTRACT

Objective: The objective of this study is to evaluate the risk factors in very low birth weight preterm newborns screened for retinopathy of prematurity (ROP) in a tertiary care hospital and to find the relationship of risk factors to the severity of disease. Very few reports on risk factors of ROP are available from this part of South India.

Methods: A prospective screening study was done enrolling 812 preterm babies during the period April 2013 to April 2015 and followed up until maturation of retina or regression of disease. The study population included preterms ≤ 32 weeks and or ≤ 1500 g at birth admitted in newborn intensive care unit. Nested case control analysis was done in 203 cases with ROP against a control group of 609 babies. Multivariate analysis of binary logistic regression model was performed by taking ROP as dependent variable and independent variables were those which were found significant ($p < 0.05$).

Results: On multivariate analysis apart from low birth weight and low gestational age, risk factors found statistically significant were apnea ($p = 0.020$), blood transfusion ($p = 0.001$), hyaline membrane disease ($p = 0.035$), phototherapy ($p = 0.033$), ventilator support ($p = 0.033$) and oxygen use more than seven days ($p = 0.007$). Factors significantly associated with severity of ROP were oxygen by continuous positive airway pressure ($p = 0.02$), congenital pneumonia ($p = 0.001$), shock ($p = 0.02$), hyaline membrane disease ($p = 0.03$) and surfactant use ($p = 0.003$).

Conclusion: Compromised pulmonary function along with oxygen, surfactant therapy and shock are important risk factors for severe ROP. Antenatal risk factors have no significance in the development of ROP.

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1. Introduction

Retinopathy of prematurity (ROP) is a potentially blinding disorder of developing retina in premature and low birth weight infants. Since the advent of recent developments in resuscitation and monitoring in neonatal intensive care units, and consequent improved survival rate of premature babies, ROP is emerging as a significant cause of visual disability in children of developing countries like India.¹

The global initiative for elimination of avoidable blindness targets ROP for prevention and treatment in an effort to decrease the prevalence of childhood blindness.² The abnormal neovascular development in ROP is fragile and can leak or bleed, scarring and pulling the retina causing retinal detachment, which is the main cause of visual impairment and blindness in ROP.³

The aim of this study was to find out the risk factors in preterm babies screened for ROP and to find the relationship of risk factors to the severity of the disease.

2. Materials and methods

A prospective follow up study was done from April 2013 to April 2015. According to the inclusion and exclusion criteria, 812 preterm babies were selected for the study. The sample size was calculated based on approximate prevalence of low birth weight babies among the control population. Sampling was done by taking all cases of ROP consecutively identified in preterms ≤ 32 weeks and or ≤ 1500 g at birth admitted in newborn intensive care unit (NICU) of a tertiary care hospital and controls were selected concurrently from the same population. In order to achieve more precision, ratio of case to control was fixed at 1:3. A nested case control analysis was done in 203 babies who developed ROP of varying severity on screening as against a control group of 609 babies assigning three controls for every case of ROP detected. Babies with severe congenital anomalies or media opacities like congenital cataract, glaucoma were excluded from the study.

All preterm babies satisfying the inclusion criteria were screened for ROP four weeks after birth or at 34 weeks post conceptual age whichever was earlier⁴ by ophthalmologist. These preterm infants were followed up periodically until maturation of retina or regression of the disease. Antenatal history was collected from maternal health records and perinatal history was taken as assessed from NICU records.

The eyes of these preterm infants were dilated using 1% tropicamide and 2.5% phenyl ephrine eye drops applied 10 min apart 1 h before the examination. The babies were adequately fed and burped sufficiently prior to examination. Indirect ophthalmoscopy was performed after instilling topical anesthetic drops and with the help of Alphonso speculum and scleral depressor. International classification of ROP (ICROP)⁵ was used to classify the severity of the disease. Interventions and follow up examinations were done according to the Early Treatment of ROP (ETROP)⁶ guidelines depending on the type and severity of ROP until regression.

The variables studied include antenatal and postnatal risk factors. Maternal factors analyzed were age, parity, type of

delivery, assisted conception, multiple pregnancy, pregnancy complications like pregnancy induced hypertension (PIH), gestational diabetes (GDM), intrauterine growth retardation, antepartum hemorrhage (APH), fever, premature rupture of membranes (PROM) with or without chorioamnionitis and prenatal steroids administration. Completed antenatal steroids administration include two doses of parenteral beta-methasone given 24 h apart when preterm delivery was anticipated.

Details of the babies like gestational age, birth weight, sex, asphyxia, apneic episodes, type of oxygen supplementation and duration, blood transfusion, sepsis, shock, hyperbilirubinemia and phototherapy were recorded. Gestational age was determined by antenatal ultrasound in first trimester, calendar method and confirmed by neonatal examination, according to New Ballard Score.⁷ Birth weight was assessed by electronic infant weighing scale. Birth asphyxia was considered if Apgar score at 1 min was less than six. Apnea was defined as cessation of respiration for more than 20 s or cessation of respiration of any duration accompanied by bradycardia or cyanosis. Intrauterine growth retardation was defined as birth weight for gestational age less than tenth percentile.

Oxygen administration was done based on Neonatal intensive care (NICU) guidelines of the hospital. Low flow oxygen delivery was given through devices like nasal prongs and oxygen hoods. High flow oxygen supplementation devices include continuous positive airway pressure (CPAP) machine and high flow oxygen system or ventilator. All newborns receiving oxygen were continuously monitored for oxygen saturation (SpO_2) using pulse oxymeter. The fraction of inspired oxygen (FiO_2) was adjusted between 0.3 and 1 so that SpO_2 of 93–95% was obtained. Arterial blood gas was monitored periodically in ventilated cases.

Diagnosis of sepsis was considered by clinical suspicion, rapid diagnostic tests and microbiological confirmation. Among cases with sepsis microbiologically culture proven sepsis was diagnosed in 16% cases. Shock was diagnosed clinically by evidence of poor perfusion with tachycardia or prolonged capillary refill time more than 3 s and with non-invasive blood pressure measurement using appropriate sized cuff.

Ethical clearance was obtained from the institutional ethics committee and informed consent of parents was obtained. The study conforms to the guidelines of declaration of Helsinki. Statistical analysis was performed using SPSS version 22 (Statistical Package for Social Sciences IBM Corp., New York, NY, USA). Univariate analysis was conducted using Chi square test. A multivariate analysis of binary logistic regression model was performed by taking ROP as dependent variable and the variables which were found significant during univariate analysis were taken as independent variables. The adjusted Odds Ratio with 95% Confidence Interval was obtained for the risk factors which were shown to be significant in univariate analysis. A probability (p) of less than 0.05 was considered to be significant.

3. Results

Among the cases diagnosed as ROP 53.7% were males and 46.3% were females as compared to 54.2% and 45.8%

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