



## ASSOCIATION OF NEONATAL HYPERBILIRUBINEMIA WITH CORD BILIRUBIN IN A BACKGROUND OF ABO INCOMPATIBILITY

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**ABSTRACT** **Background:** Neonatal hyperbilirubinemia (NH) is a prevalent condition, often resulting from ABO incompatibility. Early identification of infants at risk is crucial to prevent severe complications such as kernicterus. **Objective:** To assess the predictive value of cord blood bilirubin in determining the risk of significant hyperbilirubinemia in term neonates with ABO incompatibility. **Methods:** A prospective observational study was conducted on 75 term neonates with blood group A or B born to O-positive mothers. Cord blood samples were analyzed for bilirubin, hemoglobin, and PCV. These parameters were compared with postnatal bilirubin values at 48–72 hours. Statistical analysis included t-tests and correlation tests. **Results:** Out of 75 neonates, 15 (20%) developed significant jaundice by Day 3. Mean cord blood total bilirubin was significantly higher in neonates with bilirubin  $\geq 15$  mg/dL ( $3.81 \pm 1.07$  mg/dL) compared to those with  $< 15$  mg/dL ( $2.00 \pm 0.58$  mg/dL) ( $p < 0.001$ ). A cord bilirubin cutoff  $\geq 3$  mg/dL had 98.35% specificity and 96.75% negative predictive value for detecting significant hyperbilirubinemia. **Conclusion:** Cord blood bilirubin is a valuable early marker in predicting the risk of neonatal hyperbilirubinemia in ABO-incompatible neonates. It allows targeted monitoring and early intervention, potentially reducing hospital admissions and complications.

**KEYWORDS :** Neonatal hyperbilirubinemia, ABO incompatibility, Cord blood bilirubin, Term neonate, Hemolytic disease of the newborn, Kernicterus prevention

### INTRODUCTION

Neonatal hyperbilirubinemia (NH) is a significant concern for parents as well as pediatricians. It is the most common clinical abnormality in the neonatal period, which affects 60% and 80% in term and Preterm babies, respectively, during the first week of life.<sup>(1,2)</sup>

Hemolytic disease of the newborn is a well-established risk factor for developing severe hyperbilirubinemia and kernicterus. Blood group incompatibility is one of the most common cause for immune hemolytic disease of newborn, Rh incompatibility is the most prevalent cause for mild, moderate, and severe HDN as the red blood cell destruction begins in intrauterine life which leads to severe anemia, hydrops fetus, and death in utero.

To Collecting cord blood at birth for blood type and Direct Antiglobulin test considered when the mother is type O, and a previous child had a hemolytic disease of the newborn due to ABO incompatibility.<sup>(3)</sup>

The present study designed to evaluate the predictive value of cord blood bilirubin levels with subsequent hyperbilirubinemia in the neonate's blood group of A or B.<sup>(4,5)</sup>

### AIMS & OBJECTIVES

To assess the association between the cord bilirubin levels with subsequent Neonatal Hyperbilirubinemia in the newborn with a setting of ABO incompatibility

To correlate the Cord Blood Bilirubin level with subsequent Neonatal Hyperbilirubinemia in the newborn with a setting of ABO Incompatibility

### MATERIAL/SUBJECTS & METHODS

**Sample Size:** 75

**Period Of Study:** JAN 23-AUG 23

**Place Of Study:** PESIMSR, KUPPAM.

### Inclusion Criteria:

1. Newborns of blood group A or B Positive born to Mothers with O positive blood group
2. Healthy full-term newborns with a birth weight of  $\geq 2.5$  kgs

### Exclusion Criteria:

1. Rhesus blood factor incompatibility.
2. Blood group O positive babies.
3. Significant illness requiring NICU admission.
4. Major congenital anomalies.

5. Chronic maternal disease.

6. Those who didn't give consent to follow up

### METHODS :

Consent obtained from the parents of the newborn before enrolling them in the study. Demographic profile and relevant information were collected by using structured proforma from the mother. Gestational age assessed by the modified Ballard score. All babies were evaluated daily for jaundice and its severity. Cord blood for Bilirubin, blood group, hemoglobin, packed cell volume, and venous samples for Bilirubin, hemoglobin, packed cell volume at day 3 (after 48hrs Of life) had sent for laboratory

### RESULTS:

**Table 1: Distribution Of Neonates According To Birth Weight (N=75)**

Birth weight(kg )	No.of neonates	Percentage
2.5 –3 kg	53	70.7
3 –3.5 kg	17	22.6
3.5 –4kg	4	5.3
>4kg	1	1.3

**Table2: Distribution Of Neonates According To Blood Group (N=75)**

Blood group	No.of neonates	Percentage
A+	27	36
B+	48	64

**Table 3: Significant Jaundice In Study Population (N=75)**

Day 3 total bilirubin	No.of neonates	Percentage
<15 mg/dl	60	80
$\geq 15$ mg/dl	15	20

**Table 4: Cord Blood And Postnatal Parameters Of The Study Population (N=75)**

parameters	Cord blood	Day3 (postnatal)
Total bilirubin	$2.35 \pm 1.00$	$13.6 \pm 3.56$
Direct bilirubin	$0.25 \pm 0.10$	$0.37 \pm 0.13$
Hemoglobin	$16.11 \pm 1.8$	$15.23 \pm 1.79$
PCV	$49.17 \pm 6.63$	$46.93 \pm 5.48$

**Table 5: Diagnostic Predictability Of Cord Bilirubin For Significant Hyperbilirubinemia In Study Population**

Cord Bilirubin	Significant Jaundice	Insignificant Jaundice
$\geq 3$	13	1
$\leq 3$	2	59
total	15	60

**Table 6: Comparative Evaluations Of Cordblood And Postnatal Parameters**

Variable	Mean $\pm$ SD (Total)	Bilirubin <15	Bilirubin >15	P-value
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<b>Cord blood total bilirubin</b>	2.35 ± 1.00	2.00 ± 0.58	3.81 ± 1.07	<0.001
<b>Cord blood direct bilirubin</b>	0.25 ± 0.10	0.25 ± 0.10	0.29 ± 0.10	0.03
<b>Cord blood hemoglobin</b>	16.11 ± 1.83	16.19 ± 1.83	15.79 ± 1.68	0.280
<b>Cord blood PCV</b>	49.17 ± 6.63	49.69 ± 5.36	46.99 ± 10.23	0.04
<b>Day 3 total bilirubin</b>	13.6 ± 3.56	-	18.69 ± 3.18	<0.001
<b>Day 3 direct bilirubin</b>	0.37 ± 0.13	-	0.47 ± 0.13	<0.001
<b>Day 3 hemoglobin</b>	15.23 ± 1.79	15.43 ± 1.73	14.42 ± 5.94	0.006
<b>Day 3 PCV</b>	46.93 ± 5.48	47.58 ± 5.19	44.24 ± 5.94	0.003

#### DISCUSSION:

The study group consisted of 75 healthy term newborns of blood group A or B babies born to O positive mothers delivered at PESIMSR, Kuppam Cord blood Bilirubin and postnatal bilirubin at day3 (48-72 hrs of life) were estimated for all neonates.

Incidence of significant hyperbilirubinemia ( TSB >15 mg/dl at 48-72 hours of life ) in our study population was 20%

Incidence of significant jaundice was observed more in the newborns with Blood group B babies, with predominantly birth weight belongs to 2.5-3 kgs.

Mean Cord blood bilirubin and postnatal bilirubin in the study group were 2.35 ± 1.00 and 13.6 ± 3.56

There was a positive correlation between cord bilirubin and postnatal bilirubin with  $p = < 0.001$  and  $r = 0.790$

#### CONCLUSION:

ABO incompatibility is now the major cause of immune hemolytic disease of the newborn(HDN). Approximately 20% of pregnancies associated with ABO incompatibility between and mother and baby, 20% of all these babies can manifest as ABO HDN

Early identification of newborns at risk for significant hyperbilirubinemia by using simple predictors can help to prevent possible bilirubin induced neurological dysfunction

The specificity of 98.35%, Negative Predictive Value of 96.75%, with an accuracy of 96% in the present study suggests that in Healthy Term Babies with ABO incompatibility with cord bilirubin < 3.0 mg/dl can help to identify those newborns who are unlikely to require further evaluation and intervention. Babies with Cord Blood Bilirubin level  $\geq 3.0$  mg/dl should be followed more frequently to reduce mortality and morbidity due to Neonatal hyperbilirubinemia

As speculation, one may consider the umbilical cord blood to be a kind of 'file' for the newborn. As such, measuring of CBB level in the babies who are at risk of ABO incompatibility and used for a slightly or moderately Jaundiced child be considered early discharge from the hospital. <sup>(1,4,6)</sup>

#### REFERENCES:

- Bhutani VK, Johnson LH, Sivieri EM. Predictive ability of a predischarge hour-specific serum bilirubin for subsequent significant hyperbilirubinemia in healthy term and near-term newborns. *Pediatrics*. 1999;103(1):6-14.
- Maisels MJ, Watchko JF, Bhutani VK, Stevenson DK. An approach to the management of hyperbilirubinemia in the preterm infant less than 35 weeks of gestation. *J Perinatol*. 2012;32(9):660-4.
- Taksande A, Vilhekar K, Jain M. Prediction of significant neonatal hyperbilirubinemia using first day serum bilirubin level. *Indian J Pediatr*. 2005;72(3):219-22.
- Yadav S, Sethi RS, Sethi AS, Kumar L, Chaurasia OP. Cord blood bilirubin level as a predictor of pathological jaundice in newborns. *People's J Sci Res*. 2013;6(2):6-9.
- Satrya R, Widjaja M, Wati D. Cord blood bilirubin as a predictor of neonatal hyperbilirubinemia: A prospective study. *Paediatr Indones*. 2010;50(2):78-82.
- Jain A, Aggarwal R, Nagar A. Cord blood bilirubin level in predicting the development of neonatal hyperbilirubinemia. *Indian J Pediatr*. 1996;63(3):309-12.