Cord Blood Albumin as A Predictor of Neonatal Hyperbilirubinemia: A Prospective Open Label Study

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Abstract: Introduction: Neonatal jaundice is commonest physical finding during first week of life. Over 2/3 of full term newborn develop the neonatal hyperbilirubinemia (NH). Serum bilirubin over >15% is found in 3% of normal term neonates[1]. In significant number of babies (6.5%) are develop neonatal hyperbilirubinemia. It's most common cause of readmission of babies during early neonatal period. Method: This prospective study was conducted in Gopnath maternity home and neonatal intensive care unit of Sir T General Hospital, Bhavnagar. [Hardik C NJIRM 2017; 8(5):41-43]

Key Words: Neonates, Neonatal Hyperbilirubinemia (NH),Cord serum albumin(CSA),Total serum bilirubin, Prediction

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Introduction: Neonatal jaundice is commonest physical finding during first week of life. Over 2/3 of full term newborn develop the neonatal hyperbilirubinemia (NH). Serum bilirubin over >15% is found in 3% of normal term neonates[1]. In significant number of babies (6.5%) are develop neonatal hyperbilirubinemia. It's most common cause of readmission of babies during early neonatal period[2].
Usually normally delivered full term baby is discharged at 48 hours. Early discharge is done to prevent the nosocomial infection, social reason like early naming ceremony and for economical reason. American academy of pediatrics recommended follow up visits of baby after 48 to 72 hours to detect the hyperbilirubinemia[3].

Albumin is synthesized by liver and helps in transport of unconjugated bilirubin. There is paucity of reports on serum albumin or cord blood albumin levels as a predictor of hyperbilirubinemia. Keeping the aforesaid in mind we studied umbilical cord serum albumin level and followed the babies for hyperbilirubinemia and those requiring phototherapy or exchange transfusion.

Neonatal hyperbilirubinemia needs appropriate and timely treatment no matter whether it may arise from physiological or pathological cause[4]. However left untreated physiological jaundice may tend to resolve spontaneously in most of neonates where as in pathological jaundice substantial number of cases especially those with hemolytic states such as Rh, ABO incompatibility minor blood group incompatibility [5,6] or G6PD deficiency, the hyperbilirubinemia may reaches to level which is toxic enough to cause brain damage.[7]

The concept of prediction of jaundice is an attractive option to pick up babies at risk of NH at birth; to prevent brain damage, by predicting the newborns those are high risk for developing significant jaundice.

Objective of my study: To study the association between level of cord blood albumin and development of significant neonatal jaundice requiring intervention like photo therapy or exchange transfusion.

Method: Flowchart figure
Inclusion Criteria: Full term baby of both genders , Birth weight of 2.5 kg or more, Any route of delivery (vaginal or caesarean section), APGAR 7 or more at 1 min and 10 at 5 min.

Exclusion Criteria: Preterm(<37 weeks), Instrumental delivery (Forceps or vacuum), Rh incompatibility, Birth asphyxia, Meconium stain liquor, Intra uterine growth retardation(IUGR), Lethal Congenital anomaly, Maternal risk factor like chorioamnionitis, Premature rupture of membrane, Foul smell liquor, Intra partum fever.

Method: This prospective study was conducted in Gopnath maternity home and neonatal intensive care unit of Sir T General Hospital, Bhavnagar. Permission was granted by institutional review board. The study consists of 100 eligible term neonates delivered from 1st January 2016 to 30th June 2016. Verbal Consent was taken from mothers or other relatives after clear explanation of purpose of the study and involved procedure. Relevant maternal information was collected by interviewing mother and from mother case record. Two ml of cord blood was collected during delivery and cord serum albumin estimation

was analyzed by Auto analyzer (spectro photometry) method. All babies were assessed daily for first 4 post neonatal days for neonatal hyperbilirubinemia. Hyperbilirubinemia was scored according to Kramer dermal scoredaily[8]. Estimation of total serum bilirubin was done by dimethyl sulfoxide test. Serum bilirubin was estimated as and when required and for study purpose estimation was done between 72 -96hours of age from one ml venous sample. Those babies who developed hyperbilirubinemia before 48 hours were excluded from study and evaluated for cause of jaundice. Babies were discharged after 4 days of life or later.

Serum bilirubin level >15 mg/ml after 72 hours of life was considered as significant hyperbilirubinemia and treatment advised as per AAP guideline2004[9].

Results: Total 100 newborns were studied, among them 51 were male and 49 were female. Observations are as shown in Table below: (image)

Discussion: Incidence of hyperbilirubinemia in my study is 10% which correlates with other studies at 8.3% to 12.8%.[10,11]The study cohort are divided into three groups A,B and C based on cord serum albumin level < 2.8, 2.8 to 3.3, and >3.4 g/dl respectively. In group A, 7(77%) out of 9 babies developed SH, group B 3(7.1%) out of 42 developed NH. No babies developed NH in group C. 70% babies who developed SH fall in group A. SuchandaSahu (2011) found that 70% (14/20) neonates who develop significant neonatal hyperbilirubinemia (NH) had cord serum albumin <2.8g/dl, 30% (6/20) neonates had cord serum albumin (CSA) level 2.9-3.3g/dl and none of neonates with CSA level >3.4 g/dl developed NH (p <0.001).[12] Our study correlated well with this study.

Conclusion: There is significant correlation between cord serum albumin level and neonatal hyperbilirubinemia in healthy full term neonates>2.5 k birth weight.

Cord blood albumin level less than 2.8 mg/dl can be used a risk indicator in predicting the development of neonatal hyperbilirubinemia at birth. There was 77% high chance of developing the significant neonatal hyperbilirubinemia in this group. This we can use as a screening tool for neonatal hyperbilirubinemia for term neonates and is useful in individualizing the follow up and planning for early discharge.

When cord blood albumin <2.8g/dl is used as cutoff sensitivity is 70.00% and specificity is 97.7% at 95% confidence interval. Sensitivity increases to 100% when cord blood albumin <3.3 g/dl is used as cutoff. Cord blood albumin level 3.4 g/dl or more can be considered safe for early discharge.

No correlation was found between NH and mode of delivery, sex and weight of babies. Babies with ABO incompatibility are at risk for significant hyperbilirubinemia.

Recommendation: Babies with cord s. albumin < 2.8 g/dl should be discharged after 4 days but if discharged then called for early follow up. There latives are to be counseled for risk ,dangerous signsand watch for jaundice.

Babies with cord s. albumin > 3.3 g/dl can be discharged early without risk of developing NH. as none of neonates developed SH in this group.

What is already known?: Early discharge of newborns after delivery is fraught with the risk of missing out the babies who might develop NH.

What is my study adds?: Incidence of neonatal hyperbilirubinemia (requiring photo therapy) is more in babies with low level of cord serum albumin level.

There is no risk of development of NH till 5th day of life, if cord s. albumin is > 3.3 g/dl.

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