

Prediction of Significant Neonatal Jaundice by Cord Blood Albumin at Birth in Neonates with completed 35 weeks of gestation

Sudhakar Chiluka¹, Srinivas Madoori², Subhan Basha³, Praneet Reddy³

¹ Assistant Professor

² Professor

³ Junior Resident

Department of Pediatrics
Chalmeda Anand Rao
Institute of Medical Sciences
Karimnagar
Telangana, India.

CORRESPONDENCE:

¹ Dr. Sudhakar Chiluka, MD(Ped)
Assistant Professor
Department of Pediatrics
Chalmeda Anand Rao
Institute of Medical Sciences
Karimnagar
Telangana, India.
Email:
chilukasudhakar@gmail.com

ABSTRACT

Background and Aim: Over two third of newborn babies develop clinical jaundice. Bilirubin induced brain damage depends on free bilirubin as evidenced by mass action equation. Our study aims was to estimating the prediction of newborns at risk of developing significant neonatal jaundice early at birth, by cord blood albumin levels, and to plan follow-up programme effectively, to guide the parents, to prevent bilirubin induced neurologic damage.

Materials and Methods: This is an institutional cross sectional study. Two samples are collected from each subject, one from cord at birth and other at 72hours of life for bilirubin level. Study was done over one year including all the sequentially born neonates after completion of 35 weeks of gestation. The sample of 166 was divided into 2 groups, A and B according to cord blood albumin levels less than or equal to 3.336 gm/dL, or >3.336 gm/dL respectively and then followed till discharge. Wherever necessary further laboratory tests were done and managed accordingly.

Results: Newborns in Group A and B are 86 (51.80%), and 80(48.19%) respectively. In group A, 76 (88.37%) neonates developed jaundice, of which 10 (13.15%) required phototherapy, whereas 78 (97.5%) neonates in group B developed jaundice, of which 6 (7.69%) needed phototherapy.

Conclusion: When 3.336 gm/dL of cord blood albumin is taken as cut off, to predict neonatal jaundice at birth, it is clear from data that those with <3.336gm/dL cord albumin are at increased risk of developing significant jaundice requiring photo therapy when compared with >3.336 gm/dL. So we conclude that cord serum albumin levels may correlate the severity of neonatal jaundice.

Keywords: Neonatal jaundice, serum albumin, cord blood, gestation.

INTRODUCTION

Neonatal jaundice is common problem in the first week of life. Over two third of newborn babies develop clinical jaundice.^[1] Newborns appear jaundiced when total serum bilirubin is >7mg/dL.^[2] Our observation over six months, from July-2015 to December-2015 revealed a good number of cases who needed exchange transfusion for severe neonatal jaundice.

Bilirubin induced brain damage depends on free bilirubin as evidenced by mass action equation.^[3] So brain damage

can occur in healthy term infants even without hemolysis, which raised concern regarding the early discharge of newborn.

In late preterm infants, peak total bilirubin levels may be higher and occur later than that in term infants, near the end rather than at the beginning of the first week of life, and may therefore be discharged before they have reached peak total bilirubin levels.^[4] In addition, because of a shorter red blood cell (RBC) lifespan coupled with an impaired hepatic conjugation system, the late preterm infant has a relatively increased bilirubin production rate

as compared with the term infant. Therefore, when superimposed on a propensity for a later and higher peak total bilirubin, late preterm infants are even at a greater risk for developing hyperbilirubinemia than the term newborn.^[4] Previous similar studies not included this important late preterm sub group.

American Academy of pediatrics recommends that newborn discharged within 48 hours should have a follow-up visit after 48 to 72 hours for any significant jaundice and other problems.^[5]

This recommendation is not appropriate for our country due to limited follow-up facilities in the community and those were due to lack of knowledge of neonatal jaundice in public, ignorance of parents, lack of structured follow up, or due to delay in referral for therapy. These babies may develop jaundice which may be over looked or delay in recognition unless the baby is closely monitored.

Our study aims at utility of cord blood albumin as a predictor of significant neonatal jaundice to plan for follow up program effectively and guide parents in places with limited facilities.

MATERIALS AND METHODS

This is a cross sectional study done in 166 term and late preterm healthy neonates delivered at CAIMS hospital Karimnagar from February 2016 to February 2017.

Cord blood was collected at birth by attending pediatrician, from newborns delivered either vaginally or by c-section for albumin levels, sample for serum total bilirubin was collected when child develops significant jaundice clinically or at 72 hours of life along with TSH screening.

Inclusion Criteria

- Healthy New born delivered at or more than 35 completed weeks of gestation
- Delivered by vaginal delivery or c-section

Exclusion Criteria

- Preterm less than completed 35 weeks
- Rh / ABO incompatibility
- Neonatal sepsis or PROM > 18 hours
- 1st minute APGAR less than 7
- Meconium aspiration syndrome /moderate to severe respiratory distress (> or = 4/10)
- Neonatal jaundice within 24 Hours of life
- Sick newborn

PROCEDURE

- Institutional ethics committee approval, CAIMS was

taken and written consent from parent/guardian was obtained.

- The cord blood was analyzed by specific colorimetric assays with bromocresol green dye, and bilirubin by diazo method, and both are estimated on chemistry auto analyzer (SYSMEX, BX - 3010).
- All enrolled newborns were followed up for minimum of 72 hours bilirubin report or till discharge if stay extended beyond it, and clinical assessment for jaundice is done as per modified Kramer dermal scale.
- Under aseptic precaution 1ml of venous blood is drawn if neonate developed significant levels of jaundice before 72 hours of life along with TSH. sampling at 72 hours of life in remaining newborns and sent for estimation of serum total, direct and indirect bilirubin levels.

DATA ANALYSIS

Comparison of continuous variation was done by one way ANOVA and proportions by Chi- squared test student T test. Analysis was done using windows based SPSS statistical package 19.0.

RESULTS

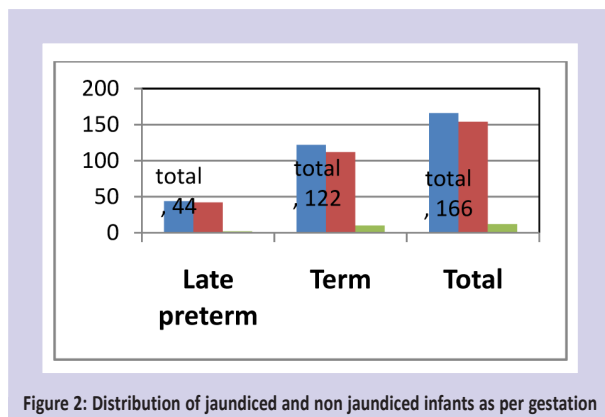
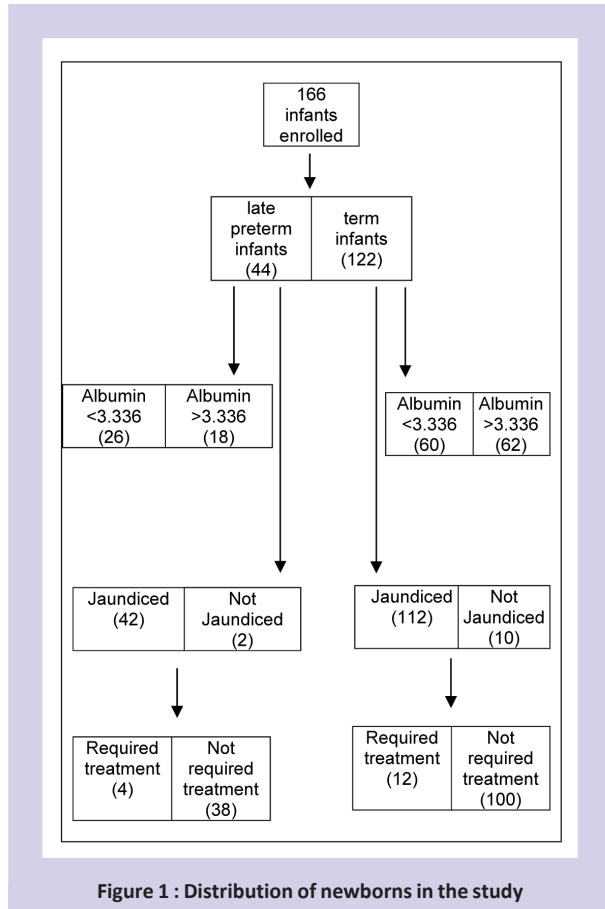
Of the 166 infants enrolled 44(26.50%) were late preterms and 122(73.50%) are term infants. Sr. albumin <3.336 gm/dl was seen in 26(15.66%) late preterm and 60(36.14%) term infants and 42(25.30%) late preterm and 112(67.46%) term infants developed jaundice of which 4(23.41%) from late preterm group and 12(7.23%) from term group required treatment as shown in fig 1 and fig 2.

Overall, 166 healthy neonates were enrolled. 154 (92.77%) got clinical jaundice and out of which 16 (10.3%) required treatment with phototherapy.

Jaundice is observed more in late preterm infants around 42(95.45%) when compared to term infants where it is 112(91.8%), as a whole 154 (92.77%) newborn infants developed jaundice.

More number of late preterm infants developed jaundice, 4(9.52%) of jaundiced required treatment with phototherapy, 12(10.71%) percentage required in term infants, both are close to over all requirement of therapy i.e., 16(10.38%).

When 3.336 gm/dL of cord blood albumin is taken as cut off, to predict neonatal jaundice at birth, it is clear from data that those with <3.336gm/dL albumin group 73(86.04%) developed jaundice and are at increased risk of developing significant jaundice requiring therapy



11(13.51%) when compared with those infants with >3.336 gm/dL albumin group who developed jaundice 72(97.50%) of which less number 6 (7.69%) are at increased risk of developing significant jaundice requiring therapy.

In this study, females are accounting for 92 (55%), and males are 74 (45%) and females have mean cord blood albumin of 3.37 gm/dL and males have mean of 3.28gm/dL, when compared to average mean of 3.336gm/dL.

Though more number of jaundiced infants are high in females 88(95.7%) than males 66 (89.2%), more number of jaundiced males 11 (15.1%) required phototherapy than females 6 (6.8%).(Table 1)

Table 1 : Mean albumin levels in relation to sex and jaundice

Gender	Male	Female
Number of babies	74	92
Mean albumin	3.28	3.37
Jaundiced	66	88
Not jaundiced	8	4

The mean cord blood serum albumin in both late preterm infants and term infants is same, i.e., 3.336 gm%, so this value is taken as cut off value for cord albumin in this study

In this study, LBW infants are accounting for 40(24%), and normal birth weight infants are126(76%), and LBW have mean cord blood albumin of 3.30 gm/dL and normal infants have mean of 3.34 gm/dL, when compared to average mean of 3.336 gm/dL (Table 2)

Table 2: Mean albumin, jaundice and need for PT as per birth weight

Birth weight	<2500	2500 and > 2500
Number of babies	40	126
Mean albumin	3.30	3.34
Jaundiced	38	116
Not jaundiced	02	10
total	40	126
Required PT	04	12

Though more number of jaundiced infants are high in LBW infants 38 (95%) than normal birth weight infants 116 (92.06%), number of jaundiced infants requiring treatment with phototherapy are almost same in LBW group4(10.5%) and normal weight group12(10.3%)

The highest value of TSB measured is 16.8 mg/dL and least is 2.5 mg/dL (fig 3)

DISCUSSION

The mean cord blood serum albumin in both late preterm infants and term infants is same, i.e., 3.336 gm% and level similar to the above (2.8-3.3gm/dl) was seen in studies by SuchandaSahu et al^[6] and Jitendra Kumar Meena et al.^[7]

Though more number of late preterm infants developed jaundice, requirement of treatment with phototherapy,

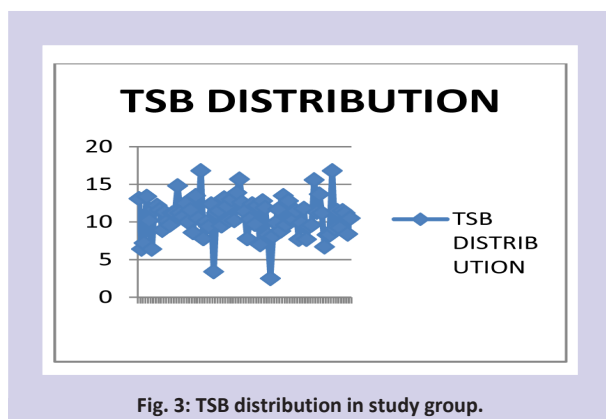


Fig. 3: TSB distribution in study group.

is same in late preterm and term infants.

As seen in studies by David K. Stevenson et al^[8] our study showed that more number of females are jaundiced, but more number of jaundiced males required phototherapy. In present study LBW have mean cord blood albumin less than normal infants as seen in studies done by Sao Paulo et al^[9] and ZakiaNahar et al.^[10]

Though more number of jaundiced infants are high in LBW infants than normal birth weight infants, percentage of jaundiced infants requiring treatment with phototherapy are almost same in both groups.

More percentage of exclusively breast fed infants developed jaundice and required phototherapy than mixed feeding (with breast milk and formula feed).

It is alarming that only 4.8% deliveries are delivered by normal vaginal delivery. The reason for the more number of LSCS in our study population is that being a referral hospital most cases which are getting admitted and are referred to our hospital will be complicated by one or the other factors, which is reflected by previous LSCS being common indicator for LSCS.

CONCLUSION

When 3.336 gm/dL of cord blood albumin is taken as cut off, to predict neonatal jaundice at birth, it is clear from data that those with <3.336gm/dLcord blood albumin group are at increased risk of developing significant jaundice requiring photo therapy when compared with those infants with >3.336 gm/dL albumin group. The simple non invasive method of blood collection may be useful to predict severity of future jaundice at birth itself.^[11] No infant needed exchange transfusion during this study period.

This study however, had a few limitations like, the sample is small, complete follow up of neonates may be more

informative. There is further need for larger studies to prevent bilirubin induced neurologic damage by effective prediction through cord blood albumin.

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CONFLICT OF INTEREST :

The authors declared no conflict of interest

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