



## USE OF CORD BLOOD ALBUMIN AS A PREDICTOR FOR NEONATAL HYPERBILIRUBINEMIA

### Pediatrics

**Dr. Saxena Manas** PG JR, Department of Pediatrics, GMC, Haldwani, Nainital, Uttarakhand

**Dr. Kumar Ashok\*** Assistant Professor, Department of Pediatrics, GMC, Haldwani, Nainital, Uttarakhand  
\*Corresponding Author

**Dr. Arya A. K** Professor and Head, Department of Pediatrics, GMC, Haldwani, Nainital, Uttarakhand

### ABSTRACT

Jaundice is a significant cause for NICU admissions. Various techniques have been developed for its early prediction, to decrease morbidity and mortality associated. Cord Serum Albumin (CSA) is one such method. The present study was conducted in STG Hospital, Haldwani on 250 neonates. They were grouped into 3 groups depending on CSA with group I-  $<2.9$  gm/dL, group II-  $2.9-3.3$  gm/dL, group III-  $>3.3$  gm/dL. They were followed up for first 3 days of life and serum bilirubin levels were measured on day 3. Group I, II and III had 113, 81 and 56 neonates respectively. In group I, 27 (23.89%) and in group II, 1 (1.2%) neonates developed significant hyperbilirubinemia requiring phototherapy, while in group III, none needed phototherapy. Thus, CSA is useful in predicting subsequent NH in neonates. Neonates with CSA levels  $>3.3$  gm/dL are probably safe for early discharge, whereas neonates with CSA levels  $<2.8$  gm/dL need a close followup.

### KEYWORDS

neonatal jaundice, cord blood albumin, phototherapy.

### INTRODUCTION

Yellowish discoloration of body or icterus neonatorum has been observed in newborns since early human civilization. In early 18th century Juncker was the first one to differentiate between true jaundice and yellowish tinge observed in many neonates<sup>1</sup>. As per various studies, about 84% of the newborns are affected by neonatal jaundice and it is one of the commonest cause for readmission to the hospital during neonatal period<sup>2</sup>. Severe hyperbilirubinemia is when total serum bilirubin is more than 20mg/dl & occurs in less than 2% of term infants and can lead to various complications like kernicterus. In the present era, maximum institutes try to discharge both mother and baby early from hospital so as to prevent hospital acquired infections. Poor follow-up of these early discharged babies can lead to an unchecked rise in serum bilirubin levels of the baby, which can increase complications and morbidity. The concept of early prediction of jaundice can be used as an option to selectively choose babies at higher risk of developing neonatal jaundice.

Albumin is produced by the liver. One of its functions is to bind to unconjugated bilirubin and therefore helps in its transport. This causes a reduction in bilirubin toxicity on the tissues and it also competes with tissues for bilirubin binding. Low production of albumin will lower its transport and binding capacity and hence, serum albumin level in a newborn can determine, whether the baby is more likely to develop hyperbilirubinemia and regular follow-up of at risk neonates early on will help to avoid complications associated with neonatal jaundice.

### METHODS

The present study was conducted in STGH and Govt. Medical College, Haldwani. The study cohort consisted of 250 randomly selected eligible term neonates delivered at our hospital between November 2016 to May 2018. The study included term babies of both genders, with any mode of delivery, with a birth weight of  $>2.5$  kg and an APGAR  $\geq 7/10$  at 1 min. Any baby with any complication or with any character acting as an independent risk factor for hyperbilirubinemia was excluded from the study. An informed consent was obtained from the parents of the newborn before enrolling them in the study. Cord Serum Albumin level was estimated at birth by collecting 2ml of cord blood. Total Serum Bilirubin (TSB) estimation was done at 72 hours of life. All the babies were followed up daily for first 5 postnatal days and babies were daily assessed for NH and its severity. The main outcome of the study was inferred in terms of NH. Serum bilirubin  $\geq 17$  mg/dl after 72 hours of life was taken as significant hyperbilirubinemia and treatment was advised, as per the American academy of pediatrics practice parameter, 2004.

### RESULTS

Table 1

|        | Frequency | Percent |
|--------|-----------|---------|
| Male   | 144       | 57.6    |
| Female | 106       | 42.4    |
| TOTAL  | 250       | 100     |

Table showing the gender distribution of the study group.

In this study, as shown in Table 1, a total of 250 neonates were chosen, 144 (57.6%) of which were males and 106 (42.4%) of which were females.

Table 2

|                            | Frequency | Percent |
|----------------------------|-----------|---------|
| $<2.8$ GM/DL (Group I)     | 113       | 45.2    |
| $2.9-3.3$ GM/DL (Group II) | 81        | 32.4    |
| $>3.3$ GM/DL (Group III)   | 56        | 22.4    |
| Total                      | 250       | 100.0   |

Table showing 3 groups on basis of CSA levels.

On the basis of CSA levels, the neonates were divided into 3 groups, Group I with 113 neonates, Group II with 81 and Group III with 56 neonates respectively.

Table 3: Co-relation of various variables with need for phototherapy.

| VARIABLES          | NEED FOR PHOTOTHERAPY |            | P value |
|--------------------|-----------------------|------------|---------|
|                    | NO (N=222)            | YES (N=28) |         |
| GENDER             |                       |            | $>0.05$ |
| MALE               | 126                   | 18         |         |
| FEMALE             | 96                    | 10         |         |
| MODE OF DELIVERY   |                       |            | $>0.05$ |
| NVD                | 12                    | 119        |         |
| LSCS               | 16                    | 131        |         |
| CORD BLOOD ALBUMIN |                       |            | $<0.01$ |
| $<2.8$ gm/dL       | 86                    | 27         |         |
| $2.9-3.3$ gm/dL    | 80                    | 1          |         |
| $>3.3$ gm/dL       | 56                    | 0          |         |

TABLE 3 shows that amongst various factors considered as risk for development of significant NH & need for phototherapy, CSA levels had a significant association.

### DISCUSSION

Off-late, there has been an increasing concern regarding prevention of bilirubin induced neural damage, both amongst the parents and the clinicians. Also there is an increasing trend towards early discharge from the hospital to prevent hospital acquired infections and minimize the burden of medical bill on the family. NH is a major cause of NICU admission. Early detection of hyperbilirubinemia prevents the various complications related to neonatal jaundice and decreases the morbidity and mortality, we need simple methods to predict the at risk newborns, so as to limit the number of newborns to be closely followed and hence,

improve the overall outcome. In this study, we have tried using CSA as a tool for prediction of hyperbilirubinemia. In our study, 28 out of 250 (11.2%) babies developed significant NH (serum bilirubin >16.9 mg/dL). Amongst previous studies, Awasthi et al (12.8%), Alpay et al (12.05%), Agarwal et al (10.3%) developed hyperbilirubinemia. Thus, our study is in agreement with previous studies in terms of incidence of hyperbilirubinemia.

Sahu et al study, 2011, showed that 70% {14/20} newborn who developed significant NH had a CSA level < 2.8 g/dl, 30% {6/20} newborns had CSA level 2.9-3.3 g/dl and none of newborns with CSA level > 3.3g/dl developed significant hyperbilirubinemia (p<0.01).

Trivedi et al, 2013, studied total of 605 newborns. Study group were divided into 3 groups based on CSA levels <2.8 g/dl, 2.9-3.5g/dl and >3.5g/dl. In group 1, 58.35% (120/205); group 2, 28.78% (59/205) and group 3, 12.68 % (26/205) developed NH (p value of <0.05).

In our study, we studied co- relation between CSA and NH in a total of 250 neonates, amongst these, 28 developed significant hyperbilirubinemia (serum bilirubin >16.9mg/dL) out of these, 27 had a CSA level ≤2.8 gm/dL, 1 had CSA in the range of 2.9-3.3 gm/dL, and none of the neonates with CSA >3.3gm/dL developed significant hyperbilirubinemia. (p value <0.01)

## CONCLUSION

Hence, the present study co-relates with the above mentioned studies by Trivedi et al and Sahu et al. Thus, low cord serum albumin levels appear to be a risk factor for prediction of NH and can be used for planning early discharge or for careful follow up of the newborn. A CSA level of <2.8 gm/dL is a risk factor for development of NH and the neonate should be carefully monitored and CSA levels of >3.4 gm/dL can be used for planning early discharge.

## REFERENCES

1. Bryon JL, Nancy DS. Hyperbilirubinemia in newborn, Pediatrics Review. 2011;32(8):341-9.
2. Sgro M, Campbell D, Shah V. Incidence and causes of severe neonatal hyperbilirubinemia in Canada CMAJ. 2006; 175(6):587-90.
3. Amar Taksande, Krishna Vilhekar, Manish Jain, Preeti Zade, Suchita Atkari, Sherin Verkey. Prediction of the development of neonatal hyperbilirubinemia by increased umbilical cord blood bilirubin. Ind Medica 2005 ; 9(1) : 5-9.
4. Alpay F, Sarici SU, Tosuncuk HD, Serdar MA, Inanç N, Gokcay E. The Value of First Day Bilirubin Measurement in Predicting the Development of Significant Hyperbilirubinemia in Healthy Term Newborns. Pediatrics. 2000 Aug;106(2):p.e16.
5. Agarwal R, Deorari AK. Unconjugated Hyperbilirubinemia in Newborn. Indian Pediatr. 2002 Aug 17;39:30-42.
6. Suchanda Sahu et al, Cord blood albumin as a predictor of neonatal jaundice, International J.Biological and medical research 2011;2(1):436-438.
7. Trivedi et al, cord serum bilirubin and albumin in neonatal hyperbilirubinemia, International Journal of Integrative Sciences, Innovation and technology.2013;2(2):39-42.