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To study the effectiveness of cord blood albumin as a predictor of neonatal jaundice

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Abstract
Neonatal hyperbilirubinemia is one of the commonest problems in newborn. It can be due to different etiologies. Most often it is physiological jaundice. The main reasons for physiological jaundice is that in an infant the liver is not mature enough to handle the freely circulating bilirubin due to higher volume of short life erythrocytes in the circulation and low level of albumin. Early detection of neonatal jaundice is essential to prevent developing kernicterus as well as discharge the babies early. Albumin is synthesized by liver and helps in the transport of unconjugated bilirubin by binding to bilirubin it and thus making it nontoxic to the body. Low levels of albumin make bilirubin free and toxic to the body. Hence, this study was done to evaluate effectiveness of cord blood albumin as a predictor of neonatal Hyperbilirubinemia.

Keywords: albumin, bilirubin, cord blood

1. Introduction

During the first week of life, neonatal jaundice is the commonest abnormal physical finding. 1-3 More than two third of the newborn babies develop clinical jaundice [1, 2]. Neonatal jaundice can be associated with multiple etiologies, the most common being physiological jaundice [3, 4]. It is a common practice nowadays that healthy term newborns born by normal vaginal delivery are discharged early because of medical and social reasons and also due to economical constraints [4, 6, 7].

According to the American Academic of Pediatrics recommendations, every newborn discharged within 48 hours should have a follow-up visit after 48 to 72 hours to look for any significant jaundice and other problems [6, 8, 9]. In our country, due to various reasons implementation of this will not be appropriate. Babies may develop jaundice and unless closely monitored it may be overlooked or there may be a delay in recognition.

Reports of bilirubin-induced brain damage occurring in healthy term infants even without hemolysis is the concern of pediatrician regarding the early discharge [4, 6, 9, 10]. By predicting the newborns developing significant neonatal jaundice early at birth, we can design and implement the follow-up program in high-risk groups effectively and thus prevent kernicterus [3].

1 molecule of Carbon monoxide and 1 molecule of bilirubin is formed by the catabolism of 1 molecule of hemoglobin. Bilirubin is non-polar, insoluble in water and is transported to the liver bound to serum albumin. Bilirubin that is bound to albumin does not usually enter the central nervous system. Hence it is thought to be nontoxic [5, 10]

Free bilirubin circulates in the body when the level of albumin is low and this is toxic to the body. In term babies physiological jaundice is seen to appear between 36 to 72 hours of age, maximum intensity of jaundice is seen on 4th day of life. Serum bilirubin doesn't exceed 15mg/dl and jaundice disappears by 10th day of life. And physiological jaundice never appears before 24 hours of life [1, 4]

In certain conditions, the bilirubin levels may exceed this duration and may cause complications like brain injury which can be prevented if detected and treated early with simple treatments like phototherapy. Clinical guide to the level of jaundice which was originally described by Kramer as the dermal staining of bilirubin may be used and confirmation can be done by measuring the levels of bilirubin. Dermal staining in an infant advances in a cephalo-caudal direction. The skin should be blanched with digital pressure and the underlying color of the skin should be analyzed. The following table gives a rough guide for the level of bilirubin dermal staining [4]

Table 1: rough guide for the level of bilirubin dermal staining Area of body Level of bilirubin Face 4-6 mg/dl Chest, upper abdomen 8-10 mg/dl Lower abdomen, thighs 12-14 mg/dl Arms, lower legs 15-18 mg/dl Palms, soles 15-20 mg/dl Several studies have shown the co-relation between decreased serum albumin and increased serum bilirubin. But to measure the serum albumin, the baby has to be pricked.

This can be avoided if the cord blood albumin is checked. The present study is conducted to find out the critical value of cord blood albumin in predicting the subsequent development of significant neonatal jaundice requiring interventions like phototherapy or exchange transfusion. By measuring cord blood albumin level, free bilirubin can be indirectly determined and neonatal hyperbilirubinemia can be identified. This could help in identifying the babies requiring intervention and those who do not and hence early discharge planning is possible.

Table 1: rough guide for the level of bilirubin dermal staining

Area of body	Level of bilirubin
Face	4-6 mg/dl
Chest, upper abdomen	8-10 mg/dl
Lower abdomen, thighs	12-14 mg/dl
Arms, lower legs	15-18 mg/dl
Palms, soles	15-20 mg/dl

2. Methods

This study was conducted in the department of Pediatrics at nalanda Medical College Hospital, patna during the study period of November 2016 to December 2016. Institutional Ethical Committee clearance and an informed consent were

obtained from the parents before the delivery of the baby. Consent was taken from the mother or from the father if the mother was in labor pain. Parents were given free choice to enroll or refuse in the study. Parents were also be given the choice to withdraw from the study at any time. This study was conducted on 50 term babies.

Inclusion criteria

Healthy term babies of both genders, birth weight >2.5 kg and Apgar more than 7 at 1 min and 5 minutes of life.

Exclusion criteria

Preterm, Rh incompatibility, Neonatal sepsis, Birth asphyxia, respiratory distress, meconium stained liquor, instrumental delivery and neonatal jaundice within 24 hours of life. Biochemical investigations: Single term normal newborns were included in the study. 2 ml of cord blood was collected in a sample bottle at birth. Cord blood albumin was estimated by auto analyzer method. All enrolled babies were followed up for 3 days and clinically assessed for jaundice according to Kramer dermal scale.

In these babies, 1ml of venous blood was drawn after 72 hours of life, or earlier if indicated, for estimation of serum total bilirubin and indirect bilirubin. The babies were followed up daily and the level of serum bilirubin was estimated and interventions were undertaken if required as per Hyperbilirubinemia management guidelines.

2.1 Statistical Analysis

Data was analyzed by test parameters (proportions, sensitivity, specificity, positive and negative predictive value) and Statistical significance test applied are chi square test or Analysis of variance (ANOVA) test.

3. Results

We grouped our sample into 3 groups according their cord blood albumin level group I being 3.3 g/dl. ANOVA test done of cord blood albumin levels between the groups showed significant differences. Out of the total 50 neonates enrolled, 7 belonged to group I (albumin 3.3 g/dl). Out of the total 7 neonates in group I, 6 (85.71%) were icteric at 24-48 hours and 1 (14.29%) was icteric at >72 hours. All the 7 neonates developed hyperbilirubinemia requiring phototherapy [3] (42.86%) out the 7 neonate required phototherapy for more than 24 hours. Out of the total 34 neonates in group II, 20(58.82%) were icteric at >72 hours, 12 (35.29%) at 48-72 hours and 2 (5.88%) at 24-48 hours. Only 12 (35.29%) neonates had hyperbilirubinemia requiring phototherapy.

Table 2: Groups based on serum albumin level. S. albumin

S. albumin	<2.8 g/dl	2.8-3.3 g/dl	>3.3 g/dl
No. of neonates	7 (14%)	34 (68%)	9 (18%)
Icterus at < 24 hours	0	0	0
Icterus at 24-48 hours	6 (85.71%)	2 (5.88%)	0 (0%)
Icterus at 48-72 hours	0 (0%)	12 (35.29%)	1 (11.11%)
Icterus at >72 hours	1 (14.29%)	20 (58.82%)	8 (88.89%)
Hyperbilirubinemia	7 (100%)	12 (35.29%)	2 (22.22%)
Requiring phototherapy	7 (100%)	12 (35.29%)	2 (22.22%)
Phototherapy for >24 hours	3 (42.86%)	1 (2.94)	0 (0%)
Exchange transfusion	0 (0%)	0 (0%)	0 (0%)

4. Discussion

Many studies have shown that the liver of neonates are immature compared to adults and hence the production and synthesis of all the proteins including albumin are reduced. Albumin is the major binding protein of bilirubin which helps in its transport to liver and thus helps in conjugation. Low levels of albumin will lower its transport and binding capacity. Free bilirubin can cross the blood brain barrier.

The clinical manifestations of bilirubin encephalopathy are insidious and progress rapidly to severe life threatening conditions. Kernicterus is a sequelae of acute bilirubin encephalopathy. This is preventable if detected and treated early. A study done by Sahu et al showed that 70% neonate who developed significant neonatal hyperbilirubinemia had cord serum albumin level 3.4 g/dl developed neonatal hyperbilirubinemia [2].

Trivedi et al in their study in 2013 showed that 205 babies out of the total 605 developed significant Hyperbilirubinemia in the study group with 58.35% of the neonates with cord serum albumin developed Hyperbilirubinemia requiring phototherapy. Our study correlated well with both these studies. Hence we can conclude that higher albumin levels are probably safe for early discharge of the baby.

5. Conclusion

Neonatal Hyperbilirubinemia is one of the most common and major issues during the neonatal period. Bilirubin levels must be estimated in all babies to prevent dangerous consequences of neonatal Hyperbilirubinemia. Cord blood albumin is an effective way to predict neonatal Hyperbilirubinemia in term healthy infants.

6. References

1. Singh M. Care of the Newborn. 7th ed, New Delhi, Sagar Publications, 2010.
2. Sahu S, Abraham R, John J, Ann A, Sam A. Cord blood albumin as a predictor of neonatal jaundice. Int J Bio Med Res. 2011; 1(2):436-8.
3. Reshad M, Ravichander B, Raghuraman TS. A study of cord blood albumin as a predictor of significant neonatal hyperbilirubinemia in term and preterm neonates. Int J Res Med Sci. 2016; 4(3):887-90.
4. Aljabri M, Khoojh F, Alsolimani A, Saleh I, Alshehri I, Alshehri M. Effectiveness cord blood albumin as a predictor of neonatal Jaundice. Int J Health Care Sci. 2016; 3(2):340-2.
5. Cloherty J, Eichenwald E, Stark A. chapter 18 - neonatal hyperbilirubinemia. manual of neonatal care. 6th ed. New

Delhi: Lippincot Williams and Wilkins, a Wolters Kluwer business, 2010, 180-211.
6. Nahar Z, Shahidullah M, Mannan A, Dey SK, Mitra U, Selimuzzaman SM. The value of umbilical cord blood bilirubin measurement in predicting the development of significant hyperbilirubinemia in healthy newborn. Bangladesh J Ch Health. 2009; 33(2):50-4.
7. Hegde PR. Cord serum bilirubin and albumin in neonatal hyperbilirubinemia Dr. Dhiraj J. Trivedi*, Divya M Markande, Vidya Bu, Manali Bhat. Int J Int sci Inn Tech Sec A. 2013; 2(2):39-42.
8. Maisels MB, Newman T. Kernicterus in otherwise healthy, breast-fed term newborns. Am Aca Pediatr. 1995. Available at http:///content/96/4/730. Accessed on 04 December 2016.
9. Venkatamurthy M, Murali SM, Hemachandra K. Evaluation of cord serum albumin level as a risk indicator in predicting neonatal Jaundice. Int J Health Info Med Res. 2014; 1(2):9-11.
10. Dhanjal GS. A study on cord blood bilirubin levels in a tertiary care centre of Haryana in India. J Biomed Pharma Res. 2013; 2(5):62-8.
11. Trivedi DJ, Markande DM, Vidya BU, Manali B, Hedge PR. Cord serum bilirubin and albumin in neonatal hyperbilirubinemia. Int J Int Sci Inn Tech Sec A. 2013; 2(2):39-42.