VOLUME - 11, ISSUE - 07, JULY - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Neonatology

TO STUDY THE ANTICIPATION OF UMBILICAL CORD BLOOD ALBUMIN LEVELS AS AN INDICATOR OF NEONATAL JAUNDICE IN HEALTHY TERM NEWBORNS – A PROSPECTIVE COHORT STUDY

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ABSTRACT **BACKGROUND:** Neonatal Jaundice is one of the commonest problems that occur in a newborn and most of the times it is physiological in. The most common cause for readmission during the early neonatal period is Neonatal Hyperbilirubinemia (NH). Hence, it's a cause of concern for pediatricians. **OBJECTIVES:** To study the Anticipation of Umbilical Cord blood Albumin levels as an indicator of neonatal jaundice in healthy term newborns. **MATERIAL AND METHODS:** The prospective study was performed on 126 healthy term newborns. Cord blood was collected from healthy term newborns, delivered either by vaginally or caesarean section for cord serum albumin level measurements. After 48 hours the babies were screened for clinical jaundice using the Kramers scale and for serum bilirubin estimation. During study period, babies were assessed clinically for neonatal hyperbilirubinemia and for any other complications. **RESULTS:** The study is grouped in to Group A, Group B, Group C based on cord serum albumin level <2.8 gm/dl, 2.8- 3.3 gm/dl, >3.3gm/dl respectively. In these groups, the newborns are compared with clinical jaundice and requiring interventions like phototherapy or exchange transfusion. Statistical analysis was done for correlation of cord serum albumin <2.8gm/dl is critical for the newborn who developed neonatal hyperbilirubinemia requiring phototherapy with sensitivity of 87.76% with a positive predictive value and negative predictive value of 87.76% and 92.21% respectively. **CONCLUSION:** There is correlation between cord serum albumin level and neonatal hyperbilirubinemia in healthy term newborns. Cord Serum Albumin <2.8gm/dl to be a risk indicator in predicting neonatal hyperbilirubinemia.

KEYWORDS : Cord Serum Albumin, Hyperbilirubinemia, Serum Bilirubin, Neonatal Jaundice, Term Newborn, Anticipation

INTRODUCTION

Jaundice is a visible manifestation in skin and sclera of elevated serum concentration of bilirubin. Neonatal Jaundice is one of the commonest problems that occur in a newborn and most of the times it is physiological in nature. It is the commonest abnormal physical finding during the first week of life in neonates.

American Academy of pediatrics recommends, the newborns discharged within 48 hours should have a follow-up visit after 48 to 72 hours of life for any significant jaundice and other problems.[1] Up to 4% of term neonates who were readmitted to the hospital during their first week of life, approximately 85% of it for jaundice.[2]

Bilirubin being non-polar and insoluble in water is bound to serum albumin and transported to the liver. Bilirubin which is bound to albumin is non-toxic and cannot cross the central nervous system. Liver is the site of synthesis of albumin. It binds to unconjugated bilirubin and helps in the transport of bilirubin to the liver where it is conjugated and then excreted in bile, in turn reducing the bilirubin toxicity in the tissue. Low production of albumin will lower bilirubin transport. Hence, determination of at-risk neonates early can help avoid the complications associated with neonatal jaundice.[3]

A Prospective study which was conducted at a Tertiary care centre in Hyderabad from July 2020 to June 2021. Term healthy newborns were included in the study after obtaining consent from the parents. Neonates with birth asphyxia, jaundice in first 24 hours of life, ABO and Rh incompatibility, neonatal sepsis, meconium stained amniotic fluid, respiratory distress and preterm babies were excluded from the study.

A written informed consent was taken from them post delivery if the baby met the inclusion criteria of the study after explaining about the study in there own language. 2ml of cord blood taken via syringe from umbilical cord under all aseptic precautions. The cord blood then transferred in a plain bulb mentioning all details of the baby for albumin level testing. After 48 hours the babies were screened for clinical jaundice using the Kramers scale. A 2ml venepuncture sample was drawn from the babies after 48 hours of life and sent for serum bilirubin.

Based on the cord blood serum albumin levels, the study was divided into group A <2.8 gm/dl , group B 2.8 to 3.3 g/dl, group C >3.3 g/dl.

RESULTS

The study included 73 (57.9%) males and 53 (42.1%) females. Of total 126 neonates, 49 (38.9%) had CSA levels <2.8 g/dl, 33 (26.2%) had levels between 2.8 and 3.3 g/dl, and 44 (34.9%) had CSA levels >3.3 g/dl. Total 43 (87.8%), 5 (15.2%), and 1 (2.3%) neonate with CSA <2.8 g/dl, between 2.8 and 3.3 g/dl, and >3.3 g/dl required phototherapy, respectively. CSA level <2.8 g/dl had a sensitivity of 87.76% with PPV and NPV of 87.76% and 92.21% respectively. . As the albumin levels increase the serum bilirubin levels decrease.

DISCUSSION

Neonatal Hyperbilirubinemia is the most common cause for readmission to the NICU after discharge in the first week of life. Neonatal Hyperbilirubinemia if not treated by phototherapy / exchange transfusion can lead to acute bilirubin encephalopathy and further progress to Kernicterus which is its chronic sequelae.[4]

In such a situation, where there is such a high birth rate, limited resources, economic burden and increased risk of nosocomial infections to the newborn, finding methods to screen babies at higher risk of developing jaundice and thus

discharging the other newborns earlier needs attention.

In this present study, we assessed the Cord Serum Albumin level as a tool for screening for the risk of subsequent Neonatal Hyperbilirubinemia.

In the present study, out of a total of 126 newborns 73 were males and 53were females. We found no significant correlation (p0.8) between neonatal hyperbilirubinemia and the sex of the newborn. Hence, the present study infers that the neonatal hyperbilirubinemia is independent of the sex of the newborn.

Out of total of 126 cases, 46 out of 71 normal vaginal delivery cases developed neonatal hyperbilirubinemia while only 37 out of 55 Caesarean section cases developed significant hyperbilirubinemia. With p value of 0.8, there is no significant association between the neonatal hyperbilirubinemia and the mode of the delivery.

The 126 newborn were included and divided into Group 1, Group 2, Group 3, based on cord Serum Albumin level < 2.8g/dl, 2.8-3.3g/dl and >3.3g/dl respectively. Out of 85 newborns who developed clinical jaundice, 48 were in group 1, 25 in group 2 and 12 in group 3. 43, 5 and 1 newborns required phototherapy were in group 1, 2 and 3 respectively. In group 1 who developed clinical jaundice 43(89.6%) required phototherapy and statistically significant (p 0.007). In our study the sensitivity of cord serum albumin level (<2.8mg/dl) as an indicator of neonatal hyperbilirubinemia found to be 87.76% while specificity, positive predictive value and negative predictive value were 92.21%, 87.76% and 92.21% respectively.

Aiyappa GKC et al, 2017, study observed 165 babies . 126 babies in Group 1 and 39 in Group 2. 44 babies (34%) in group 1 and 28 babies(71.7%) in group 2 (p< 0.0005) developed icterus of which 16 in group 1 and 19 in group 2 required phototherapy (p<0.05). The sensitivity and specificity of cord albumin in detecting neonatal hyperbilirubinemia in this study was determined to be 71.8% and 65.1% respectively.[5]

Trivedi et al, 2013, studied 605 newborns and concluded that majority of the infants who required phototherapy had a cord albumin level lower than 2.8 mg/dl.[6]

Suchanda sahu et al, studied 40 neonates and found that 82 % of neonates who had albumin levels less than 2.8 gm/dl developed hyperbilirubinemia requiring phototherapy and about 12% needed exchange transfusion. At higher levels of albumin that is 2.8 - 3.3 gm/dl 40% needed phototherapy whereas neonates with cord blood albumin > 3.3 gm/dl did not need any intervention for hyperbilirubinemia and concluded that cord blood albumin levels more than 3.3 gm/dl is probably safe for early discharge of baby.[7]

Thus, from the above results we can conclude that Cord Serum Albumin appears to be a risk indicator in predicting neonatal hyperbilirubinemia. Newborns with Cord serum albumin level < 2.8g/dl is high risk factor for future development of Neonatal Hyperbilirubinemia and must be closely observed in the hospital for development of clinical jaundice. Those with Cord Serum Albumin level >3.3 g/dl are probably safe for early discharge and should be followed up on routine visits.

		Cord Blood Albumin mg/dl		
		Mean	SD	p
Sex	Female	3.02	.70	0.8
	Male	3.05	.66	
Clinical_jaundice	No	3.76	.37	<0.0001
	Yes	2.69	.48	
Phototherapy_	No	3.47	.47	<0.0001
	Yes	2.36	.27	

Cord Blood Albumin Distribution In The Study Group

CORD BLOOD ALBUMIN	NO. OF PATIENTS	PERCENTAGE
< 2.8	49	38.9%
2.8-3.3	33	26.2%
>3.3	44	34.9%
TOTAL	126	100%

Comparision Table Of Gender Distribution And Cord Serum Albumin Levels

	ALBUMIN CATEGORY			
GENDER	<2.8	2.8—3.3	>3.3	TOTAL
FEMALE	22(44.9%)	13(39.4%)	18(40.9%)	53(42.1%)
MALE	27(55.1%)	20(60.6%)	26(59.1%)	73(57.9%)
TOTAL	49(100%)	33(100%)	44(100%)	126(100%)

Comparison Between Clinical Jaundice And Cord Serum Albumin Levels

	ALBUMIN CATEGORY			
CLINICAL JAUNDICE	<2.8	2.8—3.3	>3.3	TOTAL
YES	48(98.0%)	25(75.8%)	12(27.3%)	85(67.5%)
NO	1(2.0%)	8(24.2%)	32(72.7%)	41(32.5%)
TOTAL	49(100%)	33(100%)	44(100%)	126(100%)

Comparision Between Mean Cord Serum Albumin With Clinical Jaundice And Phototherapy

		CORD SERUM ALBUMIN		
		MEAN	STANDARD DEVIATION	P VALUE
Clinical Jaundice	NO	3.76	0.37	<0.0001
	YES	2.69	0.48	
Phototherapy	NO	3.47	0.47	<0.0001
	YES	2.36	0.27	

Comparison Between Clinical Jaundice And Cord Serum Albumin Levels

	ALBUMIN CATEGORY			
CLINICAL JAUNDICE	<2.8	2.8—3.3	>3.3	TOTAL
YES	48(98.0%)	25(75.8%)	12(27.3%)	85(67.5%)
NO	1(2.0%)	8(24.2%)	32(72.7%)	41(32.5%)
TOTAL	49(100%)	33(100%)	44(100%)	126(100%)

CORD SERUM ALBUMIN <2.8 mg/dl	ESTIMATE	LOWER – UPPER 95% CIs
SENSITIVITY	87.76%	(75.76, 94.27)
SPECIFICITY	92.21%	(84.02, 96.38)
POSITITVE PREDICTIVE VALUE	87.76%	(75.76, 94.27)
NEGATIVE PREDICTIVE VALUE	92.21%	(84.02, 96.38)
DIAGNOSTIC ACCURACY	90.48%	(84.09, 94.47)

REFERENCES

1. American Academy of Pediatrics Subcommittee on Hyperbilirubinemia. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Paediatrics 2004;114(1): 297-316
2. Kiely M, Drum MA, Kessel W. Early discharge, risks, benefits and who decides. Clinperinatol. 1998 Sep;25(3):539–53
3. Cloherty JP, Eichenwald EC, Stark AR, Chapter 18: Neonatal hyperbilirubinemia, Manual of neonatal care 6 th edition, New Delhi: Lippincot Williams & Wilkins, a Wolters Kluwer business, 2010:180-211
4. Ashima Madan, James R.Macmohan, and David K. Stevenson. Avery's Neonatology.8th edn. Philadelphia:Lippincott Williams & Wilkins;2010. Neonatal Hyperbilirubinemia in the Newborn.p1226-1257
5. Aiyappa GKC et al. (2017) Cord blood albumin as a predictor of neonatal hyperbilirubinemia in healthy neonates Int J ContempPediatr. 2017 Mar; 4(2):503-506
6. Treivedi et al, Cord Serum bilirubin and Albumin in Neonatal Hyperbilirubinemia, International Journal of Integrative sciences, Innovation and technology. 2013;2(2):39-42
7. Suchanda Sahu et al, Cord blood albumin as a predictor of neonatal jaundice, International J.Biological and medical research 2011;2(1):436-438.