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TO STUDY UTILITY OF CORD BLOOD ALBUMIN AS A PREDICTOR OF SIGNIFICANT NEONATAL JAUNDICE IN TERTIARY CARE HOSPITAL OF JHARKHAND

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ABSTRACT **Aim:** To study the association between cord blood albumin level and subsequent development of significant neonatal jaundice (NNJ) in healthy term newborns. Methods and Materials: A prospective study was done in 105 sequentially born healthy term babies(gestational age > 37 weeks) of either gender, from any mode of delivery, with any birth weight, Apgar score ≥7 at first and fifth minutes of life, without ABO and Rh incompatibility. They were divided into 3groups A, B, and C according to cord blood albumin levels < 2.8 gm/dl, 2.8-3.3 gm/dl and >3.3 gm/dl respectively and then followed clinically for jaundice upto day 5 of life or till hospital stay whichever was later. Wherever necessary further laboratory tests were done and baby managed accordingly. Results: Group A, B, and C had 21, 38, and 46 newborns respectively. In group A, 17(80.9%) neonates developed jaundice of which 15 (71.4%) required phototherapy and 1 (4.7%) needed exchange transfusion, whereas 20(52.6%) neonates in group B developed jaundice, of which 10 (26%) needed phototherapy and none required exchange transfusion. In group C 12 (26%) developed jaundice of which 1 (2.1%) required phototherapy and none of them required exchange transfusion (p value <0.001).Conclusion: Umbilical cord serum albumin levels are useful in predicting subsequent neonatal jaundice in healthy term newborns. Neonates with cord blood albumin levels > 3.3 gm/dl are probably safe for early discharge whereas neonates with albumin levels <3.3 gm/dl will need a close follow up to check for development of jaundice.

KEYWORDS : Neonatal jaundice, Cord blood albumin, Hyperbilirubinemia, Kernicterus

I.INTRODUCTION

Clinical jaundice is seen in 60-70% of term and about 80% of preterm newborns. [1] Over 6.1% of well term newborns have a serum bilirubin over 12.9 mg%. Serum bilirubin over 15 mg% is found in 3% of normal term newborns. [1] Early discharge of healthy term newborns after normal vaginal delivery has become a common practice, because of medical reasons like prevention of nosocomial infections, social reasons and also due to economical constraints. American Academic of Paediatrics (AAP) recommends that newborns discharged within 48 hours should have a follow-up visit after 48 to 72 hours for any significant jaundice and other problems. [2] This recommendation is not appropriate for our country like India due to limited follow-up facilities in the community. These babies may develop jaundice which may be over-looked or there may be delay in recognition unless the baby is closely monitored. Concern to the paediatrician regarding early discharge are reports of bilirubin induced brain damage in healthy term infants even without hemolysis. Though exact serum bilirubin level that leads to development of kernicterus in icteric newborn is not known, serum bilirubin level more than 20 mg/dl is likely to be toxic and may cause significant damage to brain. [1] The concept of prediction of jaundice offers an attractive option to pick up babies at risk of neonatal hyperbilirubinemia. Visual assessment of serum total bilirubin (STB) levels as suggested by Kramer [3] relies on the cephalocaudal progression of jaundice with a rising STB is now known to be fraught with error. There is also considerable inter-laboratory variation among STB levels measured at different laboratories. [4] Albumin helps in hepatic transportation of bilirubin and its clearance. Low serum albumin level will decrease bilirubin clearance and thus will increase significant hyperbilirubinemia. There is paucity of studies on cord blood albumin as a predictor of severity of neonatal jaundice. [5-7] Hence the present study was conducted to determine whether cord blood albumin helps in predicting subsequent development of neonatal jaundice that requires interventions like phototherapy or exchange transfusion.

II. MATERIALS AND METHODS

This prospective study conducted from December , 2015 to September 2017 in Department of Paediatrics , Rajendra Institute of Medical Sciences, Ranchi a tertiary care hospital. 105 subsequentially born neonates taken with

Inclusion criteria: Term baby (GA>37 weeks), any birth weight , APGAR score more than 7 at first and fifth minutes of life, any gender.

Exclusion Criteria: Preterm baby, Rh & ABO incompatibility, cephalhematoma, neonatal sepsis , any complications arising during the hospital stay.

Method : The relevant history of mother and baby was taken and thorough physical and clinical examination of all the neonates was performed . Investigations : Cord blood albumin , blood grouping , Rh typing and serum bilirubin. Weight of the newborn was recorded and gestational age was calculated by last menstrual period or by New Ballard score. They were followed up daily for development of jaundice, sepsis or any other illness till 5th day of life or hospital stay whichever was later as serum bilirubin reaches its peak levels between 3rd to 5th day in healthy term newborns. [8] Those suspected to have jaundice of zone ≥3 according to Kramer dermal chart subjected to serum bilirubin estimation. Wherever necessary further laboratory tests were performed and managed accordingly. These neonates were divided in three groups A, B, and C according to cord serum albumin levels < 2.8 gm/dl, 2.8 – 3.3 gm/dl and > 3.3 gm/dl respectively. The main outcome of the study was inferred in terms of significant hyperbilirubinemia which needed phototherapy or exchange transfusion (ET). The neonates who required no intervention or phototherapy and or exchange transfusion for management of hyperbilirubinemia from three groups were noted.

All data collected were entered in excel sheet to prepare master chart. Qualitative data was summarised as percentage and quantitative data was summarised as means and standard deviation. Chi-square test was used to find out the significance of difference between proportions & percentages. The mean difference of various parameters was compared by using Z-test and t-test. ANOVA was be used for cord blood albumin levels between groups and within groups to show if any significant difference observed. 'P' value less than 0.05 (<0.05) was taken as significant difference.

III. RESULT

There were 21 neonates in Group A, 38 in Group B and 46 in Group C. Fifty-three (53%) newborns were born of primi gravida mothers and 28 (28%) were born to second gravida mother. The age of onset of jaundice were noted on 2nd, 3rd, and 4th postnatal day in 22, 58 and 25 neonates respectively. Demographic characteristics were depicted in Table 1. The incidence of jaundice in all the groups and need for intervention in form of phototherapy and exchange transfusion is depicted in Table 2.

Table no:1 Demographic characterstics of newborn in three group

		Cord blood albumin level			P value
		Group A <2.8gm/dl (n=21)	Group B 2.8-3.3gm/dl (n=38)	Group C >3.3gm/dl (n=46)	
Gestational age		37.8±0.6	38.1±0.5	38.1±0.8	>0.05
Birth weight		2.8±0.3	2.9±0.3	2.9±0.4	>0.05
Gender	Male	11(52.4%)	21(55.2%)	25(54.4%)	>0.05
	Female	10(47.6%)	17(44.8%)	21(45.6%)	

Fig 1: Distribution of male and female in different group

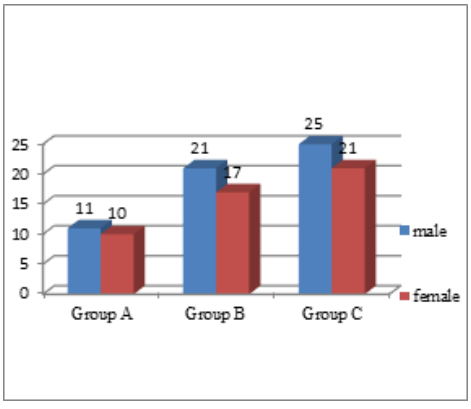
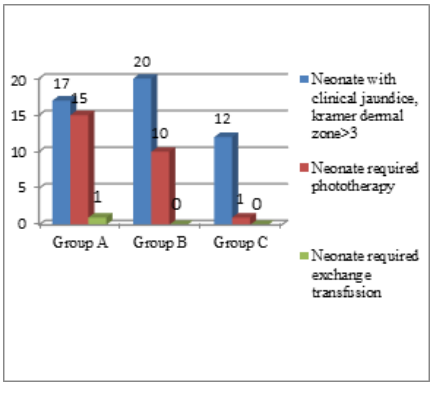


Table no :2 Incidence of jaundice in all groups and requirement of intervention in three group

	Cord blood albumin level			P value
	Group A <2.8gm/dl (n=21)	Group B 2.8-3.3gm/dl (n=38)	Group C >3.3gm/dl (n=46)	
Neonates developing clinical jaundice Kramer dermal zone >3	17(80.9%)	20(52.6%)	12(26%)	<0.001
Neonates required phototherapy	15(71.4%)	10(26%)	1(2.1%)	<0.001
Neonates required exchange transfusion	1(4.7%)	0	0	

Figure2: Incidence of clinical jaundice required intervention as phototherapy or exchange transfusion



IV. DISCUSSION

Unconjugated bilirubin is non-polar, insoluble in water and is transported to liver bound to albumin, so amount of albumin available for binding is important. One mole of albumin binds equimolar amount of bilirubin i.e. one gram of albumin bind 8.5 mg of bilirubin. [1] Bilirubin bound to albumin does not usually enter central nervous system and is thought to be non-toxic. Studies and literatures have shown that neonates have an immature liver function as compared to that of adults. As a result, there is decreased production and synthesis of all the major proteins in the newborns. On the other hand, liver at times may not be able to handle the excess production of bilirubin that may occur due to various reasons in newborn. The decrease in the production of various proteins means that there is a decrease in the production of albumin, which has a major role in the conjugation of bilirubin. Albumin acts a carrier protein for the transport of bilirubin, which eventually helps in the transfer of bilirubin to the liver where conjugation occurs. This process is interrupted due to decreased albumin levels in newborns. The impact is more so in preterm newborns, which have an even decreased albumin levels.

The age of onset of jaundice in our study in majority of neonates was on 3rd postnatal day. Other workers in their studies also noticed the onset of jaundice on 3rd and 4th postnatal in majority of neonates. Anand et al, found that 45.7% neonates had onset of jaundice on 3rd postnatal day followed 35.3% neonates on 4th postnatal day. [9] Sethi et al, reported development of jaundice on 3rd postnatal day of life in two third newborns. [10] This supports the observation that non-hemolytic jaundice in term babies appears mostly on 3rd day of life because of increase production of bilirubin, delayed maturation of liver enzymes and increased entero-hepatic circulation. [2] In our study out of 105 neonates 80.9%, 52.6%, 26% newborns developed jaundice in group A, B, and C respectively. In group A, 71.4% required phototherapy and 4.7% required exchange transfusion. In group B, 26% required phototherapy and no one required exchange transfusion, while in group C only 2.1% required phototherapy and none of them requiring exchange transfusion. Similarly in a study by Aiyappa et al out of the 165 neonates included in study, 71.8% and 34.9% babies from group A and B developed icterus. In group A cord albumin <2.8gm/dl 76.9% required phototherapy and 50% required exchange transfusion while in Group B cord albumin >2.8 gm/dl 14.7% required phototherapy and none underwent exchange transfusion.[11]Similarly Suchanda et al, in a study on 40 newborns 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 and with cord blood albumin > 3.3 gm/dl, none of the neonates needed any intervention for hyperbilirubinemia. [7] Similarly in study by Trivedi et al, on 605 infants, 205 babies developed hyperbilirubinemia of which 120 (58.5%) babies had cord serum albumin level < 2.8gm/dl, 59 (28.8%) babies had cord serum albumin level in the range of 2.8 – 3.5 gm/dl, whereas 26 (12.7%) babies developed hyperbilirubinemia even though cord serum albumin level was more than 3.5 gm/dl. (p <0.05) [6]. It is already known that some studies favour that estimation of cord blood bilirubin could predict subsequent hyperbilirubinemia, [12,13] whereas others disagreed of it, [14] hence we study cord blood albumin as a predictor of subsequent Neonatal jaundice in this part of country.

V. CONCLUSION

Umbilical cord serum albumin levels are useful in prediction of subsequent development of significant neonatal jaundice in healthy term newborns. Neonates with umbilical cord blood albumin level more than 3.3 gm/dl can be safely discharged early whereas neonates with albumin levels <3.3 gm/dl will need a close follow up to check for development of jaundice. Hence we recommended that routine estimation of cord blood albumin should be emphasized in all term newborns in institutional delivery. It will help to design and implement the follow-up programme in high risk groups effectively, and to plan early discharge of babies and mothers.

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