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ORIGINAL RESEARCH

Predictive value of serum bilirubin for detection of subsequent hyperbilirubinemia in term neonates

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ABSTRACT

Background: A TSB >5 mg/dL is known as neonatal hyperbilirubinemia, and it is a common clinical disease in infants. The present study was conducted to evaluate the predictive value of serum bilirubin within 6 hours of life for subsequent hyperbilirubinaemia in healthy term neonates. **Materials & Methods:** 80 term neonates of both genders were selected. Total serum bilirubin, direct and indirect bilirubin was estimated first, within 6 hours of life and second, after 72 hours of life by Modified Van den Bergh's kit method. **Results:** Out of 80 patients, 48 were males and 32 were females. Parity 1 was present in 42, and >2 in 38. Mode of delivery was vaginal seen in 59 and caesarean in 21. Blood group A was present in 4, B in 14, AB in 28 and O in 34. The difference was significant (P< 0.05). The mean TSB level between 2.6- 4.0 mg/dl was seen in 25, 4.1- 5.5 mg/dl in 43 and >5.6 mg/dl in 12 patients. The difference was significant (P< 0.05).TSB level (mg/dl) between 7.7-10.2 was seen in 4, 10.3-12.7 in 21, 12.8-15.3 in 40 and >15.4 in 15 patients. The difference was significant (P< 0.05). Hyperbilirubinemia was seen in 2 with bilirubin level between 2.6-4, in 5 with bilirubin level between 4.1-5.5 and in 8 with bilirubin level >5.6. The difference was significant (P< 0.05). **Conclusion:** If the total blood bilirubin level is greater than 5 mg/dL within 6 hours of delivery, it may be a predictor of the likelihood of developing hyperbilirubinemia later on.

Key words: Bilirubin, Hyperbilirubinemia, Jaundice

INTRODUCTION

A TSB >5 mg/dL is known as neonatal hyperbilirubinemia, and it is a common clinical disease in infants. A common and usually benign illness in newborns, hyperbilirubinemia, which manifests as jaundice, is a major cause of hospitalization during the first week of life.[1]There is a significant risk of neonatal death and long-term neurodevelopmental abnormalities when jaundice in certain infants worsens and develops into acute bilirubin encephalopathy and kernicterus.[2] Delays in providing effective treatments that are regularly available in high-income countries are the main cause of the disproportionately high burden of severe hyperbilirubinemia and its sequelae that still exists in industrialized nations with functional medical systems.[3]

During the first week of life, clinical jaundice is present in around 60% of term babies. Although hyperbilirubinemia typically happens without any underlying medical conditions, it can be linked to serious conditions such hemolytic disease, endocrine and metabolic problems, liver structural abnormalities, and infections.[4] The two main neurological symptoms of hyperbilirubinemia are kernicterus and acute bilirubin encephalopathy. It is crucial to detect hyperbilirubinemia and start the right treatment since if left unchecked and untreated, it might cause neurological problems.[5]The last byproduct of hemoglobin's breakdown, bilirubin, is eliminated in the bile following conjugation. Jaundice can be either pathological or physiological, depending on the bilirubin levels. Within two to three days of birth, physiological jaundice appears in newborns. On day 3, TSB levels rise to 6 to 8 mg/dL or a maximum of 12 mg/dL, and then they fall within normal ranges.[6]The present study was conducted to evaluatethe predictive value of serum bilirubin within 6 hours of life for subsequent hyperbilirubinaemia in healthy term neonates.

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MATERIALS & METHODS

The present study was conducted on80 term neonates of both genders. Parents' consent was obtained before starting the study.

The following information was gathered: APGAR score, mother's blood group, baby's blood group, birth weight, gestational age, parity, mode of delivery, and feeding habit. The Modified Van den Bergh's kit approach was used to measure total serum bilirubin, direct and indirect bilirubin, first within 6 hours of life and then after 72 hours. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 80		
Gender	**Males**	**Females**
Number	48	32

Table I shows that out of 80 patients, 48 were males and 32 were females.

Table II Baseline characteristics

Characteristics	Variables	Number	P value
Parity	1	42	0.83
	>2	38	
Mode of delivery	Vaginal	59	0.01
	Caesarean	21	
Blood group	A	4	0.05
	B	14	
	AB	28	
	O	34	

Table II, graph I shows that parity 1 was present in 42, and >2 in 38. Mode of delivery was vaginal seen in 59 and caesarean in 21. Blood group A was present in 4, B in 14, AB in 28 and O in 34. The difference was significant (P< 0.05).

Graph I Baseline characteristics

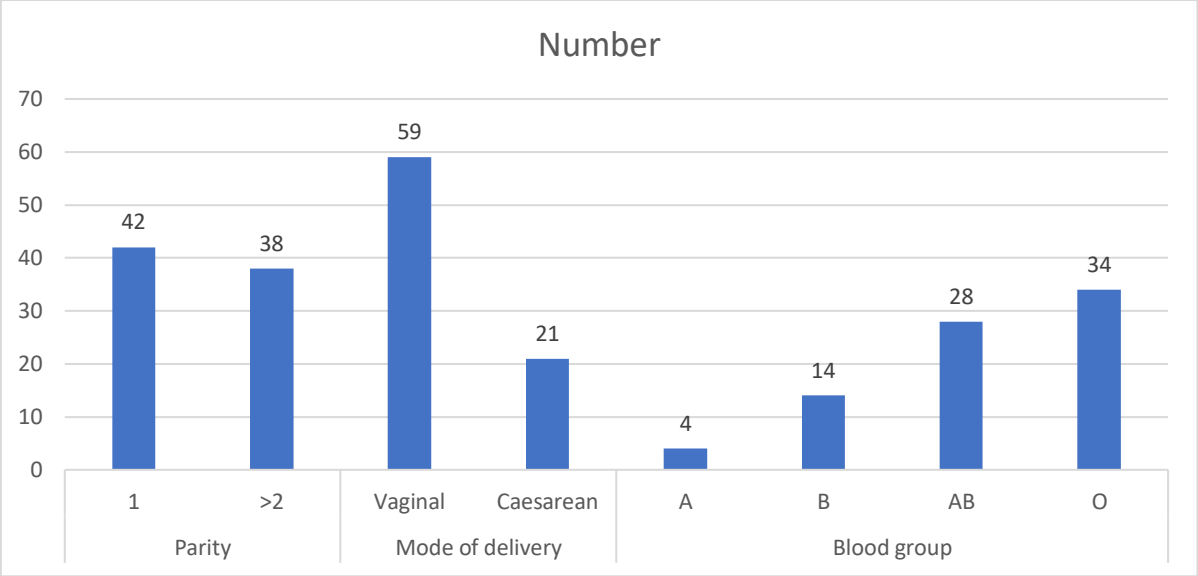

Table III Total serum bilirubin within 6 hours

TSB range within 6 hours	Number	P value
2.6-4	25	0.04
4.1-5.5	43	
>5.6	12	

Table III shows that mean TSB level between 2.6- 4.0 mg/dlwas seen in 25, 4.1- 5.5 mg/dlin 43 and >5.6 mg/dlin 12 patients. The difference was significant (P< 0.05).

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Table IV Total serum bilirubin after 74 hours

TSB range after 74 hours	Number	P value
7.7-10.2	4	0.01
10.3-12.7	21	
12.8-15.3	40	
>15.4	15	

Table IV shows that TSB level (mg/dl) between 7.7-10.2 was seen in 4, 10.3-12.7 in 21, 12.8-15.3 in 40 and >15.4 in 15 patients. The difference was significant (P< 0.05).

Table V Prevalence of hyperbilirubinemia based on TSB

TSB range within 6 hours	Hyperbilirubinemia		P value
	Present	Absent	0.05
2.6-4	2	23	
4.1-5.5	5	38	
>5.6	4	8	
Total	12	62	

Table V shows that hyperbilirubinemia was seen in 2 with bilirubin level between 2.6-4, in 5 with bilirubin level between 4.1-5.5 and in 8 with bilirubin level >5.6. The difference was significant (P< 0.05).

DISCUSSION

The majority of newborns get jaundice. Although the majority of jaundice is harmless, newborns need to be closely watched for severe hyperbilirubinemia and, in rare instances, acute bilirubin encephalopathy or kernicterus due to the possible toxicity of bilirubin.[7,8] Prematurity, a sibling who has already been afflicted, and fetal-maternal blood group incompatibility are some of the typical fetal-maternal risk factors that might predispose the children to hyperbilirubinemia. Breastfeeding, medications (oxytocin, diazepam), Asian or Native American ethnicity, and gestational diabetes are additional risk factors for mothers.[9] Neonatal risk factors include delivery trauma, some medications (such as erythromycin ethyl succinate, chloramphenicol, and sulfisoxazole acetyl), significant postpartum weight loss, infections, infrequent feedings, male gender, polycythemia, and delayed meconium passage, in addition to maternal risk factors. Neonatal jaundice is harmless, and there is no need for treatment.The present study was conducted to evaluate the predictive value of serum bilirubin within 6 hours of life for subsequent hyperbilirubinaemia in healthy term neonates.[10]

We observed that out of 80 patients, 48 were males and 32 were females.We found that parity 1 was present in 42, and >2 in 38. Mode of delivery was vaginal seen in 59 and caesarean in 21. Blood group A was present in 4, B in 14, AB in 28 and O in 34. Bhutani VK et al[11]assessed the predictive ability of a universal predischarge serum bilirubin measurement to screen for risk of subsequent significant hyperbilirubinemia in the direct Coombs negative healthy term and near-term newborn during the first postnatal week.The study patients in the nomogram were racially diverse. Nearly 60% were breastfed. Predischarge, 6.1% of the study population (172/2840) had TSB values in the high-risk zone (>/=95th percentile) at 18 to 72 hours; of these, 39.5% (68/172) remained in that zone (likelihood ratio [LR] = 14.08, sensitivity = 54%; specificity = 96.2%, probability = 39.5%). Predischarge, 32.1% of the population (912/2840) had TSB values in the intermediate-risk zone. In a clinically significant minority of these newborns (58/912 or 6.4%), the post- discharge TSB moved into the high-risk zone (LR of this move: 3.2 from the upper-intermediate zone and.48 from the lower-intermediate risk zone). The predischarge TSB in 61.8% of the newborns (1756/2840) was in the low-risk zone (<40th percentile) and there was no measurable risk for significant hyperbilirubinemia (LR = 0, sensitivity = 100%; specificity = 64.7%; probability = 0%).

We found mean TSB level between 2.6- 4.0 mg/dl was seen in 25, 4.1- 5.5 mg/dl in 43 and >5.6 mg/dl in 12 patients. We found that TSB level (mg/dl) between 7.7-10.2 was seen in 4, 10.3-12.7 in 21, 12.8-15.3 in 40 and >15.4 in 15 patients. We found that hyperbilirubinemia was seen in 2 with bilirubin level between 2.6-4, in 5 with bilirubin level between 4.1-5.5 and in 8 with bilirubin level >5.6. In healthy term neonates, Bandi et al[12] calculated the predictive value of serum bilirubin before 6 hours of life for eventual hyperbilirubinemia. The study involved one hundred and fifty healthy term babies. Two estimates of serum bilirubin levels were made: one within six hours of birth and another after seventy-two hours. The study population's TSB levels (within 6 hours of life) revealed that a maximum of 70/150 newborns had TSB levels between 4.1 and 5.5 mg/dL, while 16 infants had TSB levels greater than 5.6 mg/dL. After 72 hours of life, the TSB levels revealed that 9 infants had TSB levels between 7.7 and 10.2 mg/dL, whereas the maximum newborns (83/150) had TSB values between 12.8 and 15.3 mg/dL. A total of 18 newborns experienced hyperbilirubinemia. With a sensitivity of 100% and specificity of 89% (p=0.0001), newborns with a TSB value of >4.95 mg/dL within the first six hours of life had acquired substantial hyperbilirubinemia after 72 hours, which was highly statistically significant.

The limitation of the study is small sample size.

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CONCLUSION

Authors found that if the total blood bilirubin level is greater than 5 mg/dL within 6 hours of delivery, it may be a predictor of the likelihood of developing hyperbilirubinemia later on.

REFERENCES

1. Barrington KJ, Sankaran K. Canadian Paaediatric Society Fetus and Newborn Committee. Guidelines for detection, management and prevention of hyperbilirubinaemia in term and late preterm newborn infants. Paediatr Child Health. 2007;12(Suppl B):1-12B.
2. Alpay F, Sarici SU, Tosuncuk HD, Serdar MA, Inanç N, Gökçay E. et al. The value of first day bilirubin measurement in predicting the development of significant hyperbilirubinaemia in healthy term newborns. Paediatrics. 2000;106:16.
3. Agarwal R, Kaushal M, Paul VK, et al. Early neonatal hyperbilirubinaemia using first day serum bilirubin level. Indian Paediatr. 2002;39:724-30.
4. Randev S, Grover N. Predicting neonatal hyperbilirubinaemia using first day serum bilirubin levels. Indian J Paediatr. 2010;77:147-50.
5. Mishra S, Agarwal R, Deorari AK, Paul VK. Jaundice in the newborns. Indian J Paediatr. 2008;75:157-63.
6. Porter ML, Dennis BL. Hyperbilirubinaemia in the term newborn. Am Fam Physician. 2002;65(4):599-607.
7. American Academy of Paediatrics and Subcommittee on Hyperbilrubinaemia. Management of hyperbilirubinaemia in the newborn infant 35 or more weeks of gestation. Paediatr. 2004;114(1):297-316.
8. Kramer LI. Advancement of dermal icterus in the jaundiced newborn. Am J Dis Child. 1969;118:454-58.
9. Puppalawar PV, Goswami K, Dhok A. Review on "Evolution of methods of bilirubin estimation". J Dent Med Sci. 2012;1(3):17-28.
10. Olusanya BO, Kaplan M, Hansen TW. Neonatal hyperbilirubinaemia: a global perspective. The Lancet Child & Adolescent Health. 2018 Aug 1;2(8):610-20.
11. Bhutani VK, Johnson L, Sivieri EM. Predictive ability of a predischarge hour - specific serum bilirubin for subsequent significant hyperbilirubinaemia in healthy term and near term newborns. Paediatrics. 1999;103:6-14.
12. Bandi C, Vanaki R, Badakali AV, Pol RR, Yelamali B. Predictive value of total serum bilirubin within 6 hours of birth for the development of hyperbilirubinemia after 72 hours of birth. Journal of clinical and diagnostic research: JCDR. 2016 Sep;10(9):01.