International Journal of Contemporary Pediatrics
Kantroo S et al. Int J Contemp Pediatr. 2023 Mar;10(3):272-274
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: https://dx.doi.org/10.18203/2349-3291.ijcp20230288

Original Research Article

Correlation between transcutaneous bilirubin levels and total serum bilirubin levels in postnatal period in a tertiary care center

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Received: 23 November 2022
Revised: 05 January 2023
Accepted: 19 January 2023

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ABSTRACT

Background: Neonatal jaundice is generally a benign condition seen during the postnatal period. The non-invasive methods including transcutaneous bilirubinometry have been developed for assessment of neonatal jaundice, transcutaneous bilirubin TcB) meters noninvasively estimate the bilirubin levels by measuring light transmission through the skin of neonates this value is then to be plotted against a chart in order to look for hyperbilirubinemia. Aim was to determine the efficacy of measuring the transcutaneous bilirubin as a screening tool for clinically significant hyperbilirubinemia.
Methods: Study was a cross sectional study conducted under pediatric department of SMBT IMS and RC at tertiary care center after taking the approval from the ethical committee. Total of 110 neonates that appear to be clinically suffering from neonatal jaundice were considered for study after consent from respective parent/ guardian. Neonatal TCB levels and serum bilirubin levels were done. If bilirubin levels lie in phototherapy range, then baby was shifted to NICU and phototherapy treatment was given, and once levels came within normal range after the phototherapy treatment, again serum bilirubin levels were measured in order to compare pre-and post-treatment levels.
Results: Present study showed male preponderance. 64 were male and 46 were female. Majority 61% were full term normal delivery and 39% were LSCS. Mean TCB level was 8.5±2.8. Statistical significance was seen for TCB and sever hyperbilirubinemia.
Conclusions: Present study concluded that hyperbilirubinemia is commonly seen among males. Newborn delivered had hyperbilirubinemia. Statistical significance was seen between TCB level and severity of the disease. Thus, neonatal TCB levels can be used as a screening test for detecting hyperbilirubinemia in neonates. As TCB is a noninvasive and cost effective it can be used widely as predictor of the disease.

Keywords: Transcutaneous, Bilirubin, Serum, Postnatal

INTRODUCTION

Hyperbilirubinemia is one of the common problems in neonates. Jaundice is observed during the 1st week after birth in approximately 60% of term infants and about 80% of the pre term infants. The yellowish discoloration is due to the accumulation of lipid soluble bilirubin pigment in the skin that is unconjugated.[1]

Neonatal jaundice is generally a benign condition seen during the postnatal period, a selective number of newborns develop more significant and potentially harmful levels of serum bilirubin that may pose a direct threat of brain damage or even death.[2-4] Estimation of serum bilirubin by the visual inspection method of skin is rapid and cost-free but error in judgment is high while making the decision even by the experienced clinicians.[5] Total serum bilirubin (TSB) estimation with laboratory

method is the gold standard for assessment of the bilirubin levels but it requires blood sampling, which is an invasive procedure that can cause anemia, sepsis and pain to the infant and anxiety to the parents.[6]

Aim

Aim was to determine the efficacy of measuring the transcutaneous bilirubin as a screening tool for clinically significant hyperbilirubinemia.

Objectives

Objectives were to determine the reliability between TCB levels and serum bilirubin levels in term and pre term babies and to determine if there is a correlation between TCB levels and serum bilirubin levels after phototherapy.

METHODS

Present study was a cross sectional study conducted under pediatric department at SMBT medical college, Ghoti, Nasik after taking the approval from the ethical committee, 110 neonates that appear to be clinically suffering from neonatal jaundice or on visualization appear to be yellowish in colour (jaundice) were considered for study after consent from respective parent/ guardian.

Study duration was 2 years. December 2020-22

Inclusion criteria

All newborns in the PNC ward clinically suspecting hyperbilirubinemia and are willing to participate in the study.

Exclusion criteria

Neonates with sepsis, direct hyperbilirubinemia, major congenital anomalies, shock, previous phototherapy, blood exchange transfusion were excluded from the study.

Study was started after getting ethical approval from IEC. Neonatal TCB levels and serum bilirubin levels were done. If the bilirubin levels lie in the phototherapy range, then baby was shifted to NICU and phototherapy treatment was given, and once the levels came within normal range after the phototherapy treatment, again TCB and serum bilirubin levels were measured in order to compare pre- and post-treatment levels. A bilirubin level of more than 425 µmol/l was chosen to define severe hyperbilirubinemia.

Data analysis

Thus, all the data was collected and compiled in excel. Appropriate test was applied for analysis wherever necessary using SPSS 20 and Open Epi version 2.3.1 software.

RESULTS

Present study showed male preponderance. 64 were Male and 46 were female. Majority 61% were full term normal delivery and 39% were LSCS. Mean TCB level was 8.5±2.8. 76% neonates were breast fed and only 24% were given formula feeds. statistical significance was seen for TCB and Sever hyperbilirubinemia.

Table 1: Mode of delivery.

Delivery	Frequency	Percentage (%)
Normal vaginal	67	61
LSCS	43	39
Total	110	100

Table 2: Bilirubin levels.

Parameters	Mean	SD
TCB levels	8.5	2.8
Total serum bilirubin level	8.1	2.1

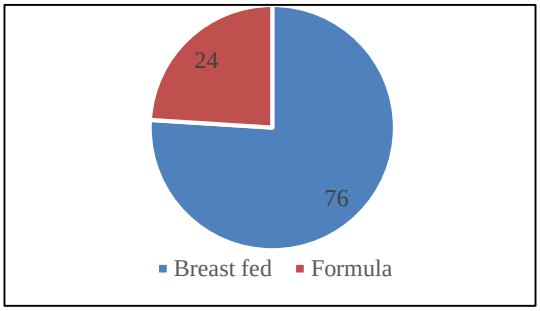

Figure 1: Feeding mode.

Table 3: Correlation of TCB level and severe hyperbilirubinemia.

TCB	Severe hyperbilirubinemia		Total
	Yes	No	
<7	16	54	70
>7	28	12	40
Total	44	66	110

Applying chi square test, $p<0.00001$, which shows statistical significance.

Diagnostic accuracy of TCB was more than total serum bilirubin for severe hyperbilirubinemia.

DISCUSSION

Present study showed male preponderance. The 64 were male and 46 were female. Majority 61% were full term normal delivery and 39% were LSCS. Mean TCB level was 8.5+2.8 and mean serum bilirubin level was 8.1±2.1. study by Nahar et al showed mean transcutaneous bilirubin and serum bilirubin value was 14.59±2.55 and 13.62±2.86 mg/dl respectively.[7]

In present study 76% neonates were breast fed and only 24% were given formula feeds. statistical significance was seen for TCB and sever hyperbilirubinemia. Diagnostic accuracy of TCB was more than total serum bilirubin for severe hyperbilirubinemia and showed positive correlation.

Study by Durre et al showed high positive correlation (r=0.82, p<0.001) between TcBR and TsBR values for high-risk neonates.[8]

Study by Fouzas et al showed that developed TcB nomogram reflects the natural history of TcB levels in healthy neonates up to the fifth postnatal day.[9] A different pattern of TcB increasing rate was noted in neonates who did and did not require phototherapy but with almost similar TcB values between the 2 groups.

Sarici et al also showed TcB level was ≥5 mg/dl in 41.98% and 25.9% of infants at age 15.0±2.1 days and 30.9±2.6 days, respectively.[10] The TcB measurement-based nomogram values of the 97th percentiles (cutoff values) at age 15.0±2.1 and 30.9±2.6 days were 11.4 (10.82-12.13) mg/dl and 10.0 (9.40-10.70) mg/dl, respectively.

Chimhini showed that fifty-five percent of the babies were male. Serum bilirubin ranged 85-408 µmol/l, transcutaneous bilirubin sternum; 170-544 µmol/l and forehead; 119-510 µmol/l. Sharma et al showed that statistical significance between TCB level and Severe hyperbilirubinemia.[11,1]

Limitations

Smaller sample size was studied. Such studies should be carried out at a large population so as to come to a conclusion.

CONCLUSION

Present study concluded that hyperbilirubinemia is commonly seen among males. Newborn delivered had hyperbilirubinemia. Statistical significance was seen between TCB level and severity of the disease. Thus, Neonatal TCB levels can be used as a screening test for detecting hyperbilirubinemia in neonates. As TCB is a noninvasive and cost effective it can be used widely as predictor of the disease.

ACKNOWLEDGEMENTS

Author would like to thanks to the department faculty and our patients.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kantroo S, Shakuntal G, Gode VK. Correlation between transcutaneous bilirubin levels and total serum bilirubin levels in postnatal period in a tertiary care center. Int J Contemp Pediatr 2023;10:272-4.