Emergency Medicine

Extended Abstract

Frequency of hyperbilirubinemia at 72 hours of life in term newborns with a high-intermediate risk serum bilirubin level at 48 hours of life, at a tertiary care hospital in Karachi - Taha Jamal, *Aga Khan University Hospital, Pakistan*

Taha Jamal

Abstract

Neonatal jaundice is common in newborns affecting over half (50- 60%) of all babies in the first week of life. Severe jaundice can result into significant morbidity in the form of Kernicterus. Early screening along with, quick treatment of neonatal jaundice helps to reduce the risk of developing severe hyperbilirubinemia, hence, Kernicterus. There is strong evidence that screening newborns with hour-specific serum bilirubin level measurements can help in identifying, risk of developing hyperbilirubinemia in newborns. In a study conducted at Pennsylvania Hospital, 12.5% of the study population (356/2840) had total serum bilirubin (TSB) values in the high-intermediate risk zone (between 75th and 95th percentile) at 18 to 72 hours; of these, 12.9% (46/356) progressed into high risk zone within 24-48 hours post-discharge.

There are studies available from developed countries regarding hyperbilirubinemia and newborns with underlying risk factors for hyperbilirubinemia However, there is insufficient data from developing countries. A study done at National Institute of Child Health Karachi, which included all newborns admitted in Neonatal ICU, showed the incidence of the neonatal hyperbilirubinemia as 13.15% but there is no data available for significant hyperbilirubinemia in term healthy newborns.

Operational Definitions:
High risk zone serum bilirubin level TSB level greater than 95th percentiles for age in hours based on normogram for an hour specific serum bilirubin concentration designed by American Academy of Pediatrics.
High-intermediate risk zone serum bilirubin level:
TSB level between 75th and 95th percentiles for age in hours based on normogram for an hour specific serum bilirubin concentration designed by American Academy of Pediatrics.
Hyperbilirubinemia Level of bilirubin ≥15 mg/dL at 72 hours of life, falling at or above the intermediate risk zone as plotted on bilirubin "Phototherapy Management Chart".

Material & Methods:
Setting: This study was conducted at the Well Baby Unit at Aga Khan University Hospital Karachi.
Duration of Study: The study was carried out over six months between January 1st 2015 and June 30th 2015.
Study Design: This was a cross-sectional study.
Sampling Technique: Non-probability consecutive sampling

Taha Jamal
Aga Khan University Hospital, Pakistan

Sample Size: Assuming a progression of 12.9 %(9) of high-intermediate risk newborns to high risk zone, a sample size of 173 newborns was needed to have an estimate that falls within 5 % of the true proportion with 95% confidence. For the sample size WHO "Sample Size Determination in Health Studies" software was used.

Data Collection: All term newborns delivered at Aga Khan University Hospital whose TSB level was done at 48 hours of life were approached. Subjects fulfilling the inclusion and exclusion criteria were enrolled in the study after acquiring parental consent. Confidentiality of participants was ensured by keeping all data in lock & key. Result of TSB was communicated to parents and caregivers only. Data was collected on a proforma and included basic demographic information, including gestational age, birth weight, and gender, baby and mother blood group. The study population was followed till 72 hours of life to determine the repeat TSB level. The outcome variable; hyperbilirubinemia was recorded as per operational definition and approved proforma.

Data Analysis: Data was analyzed using statistical package for social sciences (SPSS) version 20.0. Mean ± standard deviation was calculated for age. Frequency and percentages was calculated for gender of the baby, mother and baby blood group and hyperbilirubinemia. Data was stratified with respect to age, gender, baby and mother blood group to look for confounding factors.
Clinical experience based on assessment and recent reports suggest an increased occurrence of kernicterus (Bilirubin induced neurologic dysfunction {BIND}) in otherwise healthy newborns. Strategies to prevent BIND need to be practical, safe, effective, and based on risk assessment. Recognizing this as a matter of public health concern, in developed healthcare systems, the emphasis is on identifying the first day jaundice as a marker of significant hemolysis (unconjugated hyperbilirubinemia) and on prolonged jaundice as a sign of obstructive jaundice (conjugated hyperbilirubinemia), in particular biliary atresia. Additionally, in most of healthy term newborns that developed kernicterus, significant jaundice was almost certainly present before the first hospital discharge, (judging from the level of TSB for age in hours at readmission). Either the early icterus had not been noted or its pathologic intensity for postnatal age was not appreciated. Hour specific bilirubin levels provide an estimation of potential toxicity of bilirubin. It is in the context of identifying such newborns before dangerous levels are reached that a universal TSB screen, before discharge, is recommended as a more specific predictive vector than clinically recognized jaundice.

Conclusion: Bilirubin is not only a waste product, but also a versatile molecule that has an essential role in cellular metabolism. It is one product of a catabolic pathway that is essential for life on this planet. More importantly, however, is the understanding of the beneficial effect of bilirubin as an antioxidant as well as its harmful effects. The earlier are known to occur, but the mechanisms involved are still being investigated. Any strategy to prevent such bilirubin induced injury must begin with a sound understanding of bilirubin physiology and clinical chemistry. Understanding the cellular biology of heme catabolism and defining the roles of this ancient and elegant set of reactions in other developmental and pathological circumstances remains a scientific challenge. In my study, One-third of the term newborns having serum bilirubin in high-intermediate zone progressed to high risk zone in next 24 hours requiring treatment. There was a slight female predilection. As the study was conducted on a small scale so it may not be a true reflection of the whole picture. For future implementations we recommended that early recognition, monitoring and early treatment of neonatal hyperbilirubinemia may help in reducing morbidity. We further recommend that studies should be conducted at regional, national and international level to establish universal guidelines for monitoring and management of neonatal hyperbilirubinemia.

Note: This work is partly presented at 26th International Conference on Neonatology and Perinatology on November 15-17, 2018 held at Edinburgh, Scotland

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