RESEARCH BRIEF

Reversibility of Brainstem Evoked Response Audiometry Abnormalities at 3 Months in Term Newborns with Hyperbilirubinemia

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Received: September 13, 2012;
Initial review: October 16, 2012;
Accepted: September 05, 2013.

Background: High bilirubin level is toxic to developing brain and auditory system but the current debate surrounds the toxicity of bilirubin in healthy term infants. **Methods:** Longitudinal observational study to find BERA abnormalities in term newborns with isolated hyperbilirubinemia of 20 mg/dL and more and to follow up babies at 3 months to find out about the reversibility in BERA abnormalities noted at birth. **Results:** BERA abnormalities were present in 17.64% of babies with isolated hyperbilirubinemia at discharge. There was a reversibility of BERA abnormalities in 61.61% during follow up. **Conclusion:** BERA abnormalities are reversible in term neonates with hyperbilirubinemia.

Keywords: *BERA, Follow-up, Hearing, Outcome, Term neonates.*

Published online: September 05, 2013. PII: S097475591200803

Neonatal hyperbilirubinemia is a common clinical problem. Some two-thirds of healthy term infants and almost all premature infants develop clinical jaundice in the first week of life. In the current era of early postnatal discharge, jaundice is currently a common reason for readmission to the hospital in the first week of life in Western countries [1].

High bilirubin level is toxic to developing brain and auditory system [2], but the current major debate surrounds the toxicity of bilirubin in otherwise healthy term infants. The auditory abnormalities of bilirubin toxicity is found in many cases to be reversible as age advances. The percentage of infants with isolated hyperbilirubinemia associated with BERA abnormalities and its reversibility is still under study.

The aim of the study was to find BERA abnormalities in term newborns with isolated hyperbilirubinemia ≥20 mg/dL, and to follow up the babies at 3 months to find the reversibility in BERA abnormalities noted at birth.

METHODS

This observational study was conducted in the Neonatal intensive care unit (NICU) of Government RSRM hospital and Stanley Medical College, Chennai. Ethical committee approval was obtained. Consecutive sampling method was followed. 5793 infants were screened during routine postnatal ward rounds for a period of 7 months and 206 cases were found to have yellowish discoloration extending beyond the thigh level. Blood investigation for serum bilirubin was done and cases with serum bilirubin ≥20 mg/dL were selected. The inclusion criteria were term newborn with birth weight greater than 2500 grams and hyperbilirubinemia ≥20 mg/dL. The exclusion criteria were LBW babies, suspected sepsis/sepsis, prematurity, term IUGR, birth asphyxia (APGAR scores of 0-4 at 1 minute or 0-6 at 5 minutes), overt endocrinological /metabolic problem/neurologic causes, critically ill infant of any cause, direct bilirubin greater than 15% of total serum bilirubin, history of ototoxic drug intake, any congenital malformations, history suggestive of intrauterine infections, and family history of deafness.

Babies underwent BERA (Brainstem Evoked Response Audiometry) after discharge and abnormalities in BERA, if present, were noted. Interpeak latencies between I-III and I-V were recorded as they were more specific for hyperbilirubinemia associated hearing damage [3]. If abnormality was detected, babies were referred to an audiologist. BERA was repeated in the above population around 3 months. All cases with abnormality were followed up. Statistical analysis was done using SPSS 16 for windows.

RESULTS

Overall, 5793 babies were screened for inclusion in the study, of which 206 had clinically significant icterus. Out of these, 155 cases did not meet the inclusion/exclusion criteria. The final study comprised of 51 babies. The mean total serum bilirubin value was 23.02 mg/dL (range, 20-28 mg/dL).

WHAT THIS STUDY ADDS?

- Abnormality of BERA, seen in term neonates with hyperbilirubinemia, is reversible in majority..

BERA abnormalities (inclusive of I-III and I-V abnormality) done at the time of discharge were noted in 18 (17.6%) ears. The mean age of BERA examination after discharging the babies was 10.18 days (range, 6-18 days).

On follow up of affected cases, BERA abnormality were noted only in 7 (38.8%) of the 18 ears that had BERA abnormality at discharge. The mean age of repeat BERA was 77.55 days (range, 68-93 days). On comparing BERA abnormalities with parity, sex of the baby, weight of the baby, mode of delivery, and level of bilirubin, no significant association was found. Only two factors had significance with BERA abnormalities, namely level of bilirubin and type of treatment. On performing a binary logistic regression, only bilirubin value was found to be significantly related.

DISCUSSION

Analysis of the study results show that BERA abnormalities were reverssible in 61.6% of the 18 ears that had abnormalities at discharge. A similar observation was made by few previous studies, which reported BERA abnormalities around 22% to 28 % [4- 6]. Studies about the reversibility of BERA abnormalities show a wide percentage variation ranging from 64.2% to72.7%. [7-9].

The study brings three questions for further evaluation in follow up of hyperbilirubinemia cases. One being what would be the ideal age for screening of these infants, as early screening results in abnormal BERA in larger number of infants which may later reverse on follow up. Second, till what age can reversibility of BERA occur and third, what is the exact percentage of infants who would have persisting hearing impairment with isolated hyperbilirubinemia at birth. Follow up studies with larger number of infants with longer period of follow up may shed more light on these aspects.

Limitations of the study were that follow up was done only for 3 months, and BERA was not done at discharge and at peak levels.

Contributors: All the authors have contributed, written, designed and approved the study.
Funding: None; *Competing interests*: None stated.

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