Role of intravenous extra fluid therapy in icteric neonates receiving phototherapy

To the Editor

I read the interesting study by Saeidi et al[1] on the role of intravenous extra fluid therapy in icteric neonates receiving phototherapy. Hyperbilirubinemia (jaundice) is one of the most common conditions requiring proper evaluation and treatment in newborns. The clinical manifestation of hyperbilirubinemia occurs in 60% of normal newborns and nearly all preterm infants. Early detection and treatment of neonatal hyperbilirubinemia are important in the prevention of bilirubin-induced encephalopathy (kernicterus).[2] I have 3 comments considering the aforementioned study.

First, the data included in Table 1 of Saeidi et al's study[1] clearly demonstrated the effectiveness of both modalities, extra intravenous fluid administration besides breastfeeding (group 1) and continuous breastfeeding (group 2), in lowering serum bilirubin concentration in the studied neonates with non-hemolytic jaundice, though a statistically significant difference was demonstrated between these 2 modalities. The mean serum bilirubin decrement/hour in the first 24 hours after admission was 0.38 mg/dl (group 1) (95% CI=0.0001) compared to 0.29 mg/dl (group 2) (95% CI=0.09) (p=0.037). The effectiveness of both modalities was further augmented by demonstration that both modalities induced nearly 50% reduction in the mean serum bilirubin concentrations at discharge compared to that at admission (21.2 mg/dl and 11.2 mg/dl in group 1, 21 mg/dl and 11.7 mg/dl in group 2). Considering extra intravenous fluid administration as a modality to treat non-hemolytic neonatal hyperbilirubinemia must be taken with caution as it might be associated with potential risks of cannulae-induced thrombophlebitis, fluid overload, disturbed home environment on hospitalizing jaundiced neonates, and significant financial health burdens. These risks are superimposed on the well-known risks of phototherapy; namely, marked insensible water loss, excessive loose motions, bronze skin discoloration, disturbed baby-mother attachment, fever, retinal damage, and potential deoxyribonucleic acid damage in blood lymphocytes.[3,4] On the other hand, the continuous breastfeeding modality carries no potential risks and economically costs nothing and, therefore, currently seems sounder and safer.

Second, in a neonate, frequent bowel movements diminish the enterohepatic circulation of bilirubin, thereby increasing bilirubin excretion. Frequent breastfeeding (at least 8 times a day) will result in increased breast milk intake, less weight loss, and lower serum bilirubin concentrations.[5] In an American study,[6] a controlled clinical trial was conducted to compare the effect of 4 different interventions on hyperbilirubinemia in full term breastfed infants who had a serum bilirubin concentration equal or more than 291 µmol/L (17 mg/dl). When serum bilirubin concentration reached that level, babies were assigned at random to 1 of 4 interventions: (1) continue breastfeeding and observe; (2) discontinue breastfeeding and substitute formula; (3) discontinue breastfeeding, substitute formula, and administer phototherapy; (4) continue breastfeeding and administer phototherapy. The serum bilirubin concentration reached 342 µmol/L (20 mg/dl) in 24% of infants in group 1, 19% in group 2, 3% in group 3, and 14% in group 4. When phototherapy was used, the decline in serum bilirubin was significantly larger and more rapid (compared with no phototherapy). In most breastfed infants whose serum bilirubin concentrations reach 291 µmol/L (17 mg/dl), the serum bilirubin concentrations declined spontaneously and did not reach 342 µmol/L (20 mg/dl). While a continuous breastfeeding modality can never totally replace phototherapy or exchange transfusion, it can certainly reduce the need and/or the number of them.

Third, due to the lack of current conclusive and clear-cut evidence pointing to the optimal modality during phototherapy that can effectively with minimum unwanted sequelae lessen serum bilirubin concentrations in jaundiced neonates, wide-based clinical trials involving 3 options, notably extra intravenous fluid administration besides breastfeeding, extra oral fluids besides continuous breastfeeding, and continuous breastfeeding are warranted. It is advocated that proper history taking, meticulous clinical examination, and sound laboratory investigations must be devoted on its merit to every icteric neonate to determine the exact etiology of the hyperbilirubinemia before applying a specific therapy. Cautions, therefore, must be exercised in adopting a specific therapeutic modality to treat neonatal non-hemolytic jaundice considering the pros and cons of each modality. Parents must be involved in decision-making, and their informed consent must be obtained. This would definitely help minimize the potential risk of kernicterus.

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Reply from the Author

Many thanks to Prof. Al-Mendalawi for his comments on our manuscript.[1] Our findings revealed

that extra intravenous fluid administration can significantly reduce serum bilirubin levels during its administration. But after discontinuation, both case and control groups did not show any significant difference in serum bilirubin levels at discharge. Therefore, if this fluid therapy had been continued on all days of the hospital stay, in the case group, the serum bilirubin levels would probably have shown a significantly lower rate at discharge. Therefore, it is suggested that in further studies additional fluid is taken during the entire course of hospitalization to compare case and control groups bilirubin levels at discharge. In our study, both groups had breast milk feeding. The enterohepatic cycle can be reduced by receiving breast milk. However, due to sleepiness of some of the very icteric neonates and therefore, a decrease in the oral intake of breast milk, it seems that starting intravenous fluid can help reduce severe hyperbilirubinemia while it is administrated. Finally, it seems that worried parents can be relieved when high serum bilirubin levels are reduced by extra fluid administration to jaundiced neonates.

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References

1. Saeidi R, Heydarian F, Fakehi V. Role of intravenous extra fluid therapy in icteric neonates receiving phototherapy. ***Saudi Med J*** 2009; 30: 1176-1179.
2. Watson RL. Hyperbilirubinemia. ***Crit Care Nurs Clin North Am*** 2009; 21: 97-120.
3. Maisels MJ, McDonagh AF. Phototherapy for neonatal jaundice. ***N Engl J Med*** 2008; 358: 920-928.
4. Tatli MM, Minnet C, Kocyigit A, Karadag A. Phototherapy increases DNA damage in lymphocytes of hyperbilirubinemic neonates. ***Mutat Res*** 2008; 654: 93-95.
5. Semmekrot BA, de Vries MC, Gerrits GP, van Wieringen PM. [Optimal breastfeeding to prevent hyperbilirubinaemia in healthy term newborns]. ***Ned Tijdschr Geneeskd*** 2004; 148: 2016-2019. Dutch.
6. Martinez JC, Maisels MJ, Otheguy L, Garcia H, Savorani M, Mogni B, et al. Hyperbilirubinemia in the breast-fed newborn: a controlled trial of four interventions. ***Pediatrics*** 1993; 91: 470-473.

Statistics

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