

Transcutaneous bilirubin measurement in healthy Saudi term newborns

To the Editor

I read with interest the study by Alsaedi¹ on the transcutaneous bilirubin (TcB) measurement in healthy Saudi term newborns. The author addressed that TcB measurement provided accurate estimates of total serum bilirubin (TSB) values and it can be used effectively to screen newborns for significant jaundice.¹ I presume that such conclusion ought to be cautiously taken. Apart from 4 limitations addressed by the author, I presume that the following 4 points might be additionally contributory and they could cast suspicions on the accuracy of the study results and hence, the implication in the clinical setting. 1) In the methodology, the author mentioned that BiliCheck device displayed the average in micromole/l of 5 measurements from different areas of the forehead for each bilirubin.¹ Recently published studies have shown that measurement of transcutaneous bilirubin on the sternum had higher accuracy as compared to serum bilirubin measurement on the forehead.^{2,3} 2) There are numerous different transcutaneous bilirubinometers (TcBm) in the clinical setting to estimate TcB. Comparative studies have shown varied agreement of TcBm with each other and TSB.⁴⁻⁶ 3) The author addressed that the study was conducted in the western region of Kingdom of Saudi Arabia with a population of diverse ethnic backgrounds and various degree of skin pigmentation.¹ I presume that the different racial backgrounds of the studied population could alter the precision of the study results as it has been noticed that the race could affect TcB bias when measurements were carried out on the forehead, but not when they were carried out on the sternum.⁷ 4) Better interpretation of TcB measurement in the neonatal clinical setting is based on an hour-specific, percentile-based TcB nomogram.⁸ To my knowledge, such nomogram is not yet constructed during the early neonatal period for Saudi neonates. Despite the aforementioned limitations, I think that TcB measurement represents a revolutionary step in the management of neonatal jaundice as it is associated with less pain related to heel prick as well as 55% reduction in blood samples taken in jaundiced term and near-term babies.⁹

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Reply from the Author

I would like to thank Prof. Al-Mendalawi for his interest and comments on our paper. He questioned the accuracy of TcB measurement at the forehead as compared with its measurement at the sternum, the different devices used for TcB measurement and the effect of race and skin color on the accuracy of TcB measurement. First, the objective of our study was not to compare the accuracy of the site of TcB measurement neither to compare different devices of measurement of TcB. Second, there are conflicting reports regarding the accuracy of measuring TcB at forehead versus measuring it from the sternum. Even the studies which concluded that either site is superior, the difference is minute to have any clinical implications. He quoted 2 studies by Conceição et al³ and Kosorat and Khuwuthyakorn.² Conceição et al³ reported that the correlation between TSB and TcB as measured at the forehead had better correlation when compared with TcB measurement from the sternum ($r=0.704$ versus $r=0.653$). However, the mean value of TcB measured at the sternum (9.9 ± 2.2 mg/dL) compared to plasma levels (10.2 ± 1.7 mg/dL), is better compared with the mean value of TcB measured at the forehead (8.6 ± 2.0 mg/dL) ($p<0.05$). The correlation coefficient of measurements from either site is much less than what was reported in the literature where the correlation coefficient ranged from $r=0.080$ to $r=0.91$. It is not known whether this was due to the study population, methods used, or both. Kosorat and Khuwuthyakorn² reported that measuring TcB from 4 sites from the forehead and 4 sites from the sternum. The correlation coefficients between TcB at forehead and TSB were significant for 2 ($r=0.812$), 3 ($r=0.800$), and 4 ($r=0.800$) measurements. Transcutaneous bilirubin measured at sternum also had significant correlation with TSB ($r=0.829$ for 2, $r=0.844$ for 3, and $r=0.823$ for 4 measurements). Although TcB measurement from the sternum has a better correlation, but its measurement from the forehead is more precise. Marenez et al¹⁰ reported that measurement of TcB from the forehead has better correlation with TSB than TcB measurement from the sternum ($r=0.841$ versus $r=0.794$). Third, the effect of race and skin color on the accuracy of TcB measurements. We have mentioned in our discussion that BiliCheck scans the whole spectrum of visible light and automatically subtracts the beam reflected by confounding factors, such as hemoglobin, dermal thickness or melanin, and it isolates the absorption of light due to bilirubin in the capillary bed and subcutaneous tissue; therefore, calculating the concentration of bilirubin. Several

studies¹¹⁻¹³ reported that skin color and race has no effect on accuracy of TcB using BiliCheck device.

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Ethical Consent

All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed.