

AB036. The effects on accuracy of image-based estimating neonatal jaundice with a smartphone APP in the different conditions

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Background: To study the effects on accuracy of automated image-based estimating neonatal bilirubin (AIB) with a smartphone APP in the different conditions.

Methods: The jaundiced neonates were enrolled from in-patient neonatal ward of The Affiliated Xuzhou Center Hospital of Nanjing University of Chinese Medicine during August 2017 to December 2017. When the blood biochemistry including total serum bilirubin (TSB) need to be tested, the transcutaneous bilirubin (TcB) and AIB on the sternum were measured simultaneously, and on the glabella and the visual most yellow area were measured at the same time in some cases. The gender, gestational age, birth weight, the hours after birth and the detection period of time were recorded. The AIB were measured by OPPO R11 smartphone, and by Huawei Mate 8 and iPhone 6 at the same time in some cases, with an APP of mobile monitoring neonatal jaundice (BiliScanTM). SPSS 20.0 software was used for data analysis. Data were compared by noninferiority trial, student's *t* test, ANOVA, Pearson correlation analysis, Bland-Altman plots consistency analysis or receiver operator characteristic (ROC) curve.

Results: A total of 247 sets of data were enrolled from 179 neonates in this study. The mean gestational age was (36.2±2.1) weeks, the mean birth weight was (2,871±735) g. The mean difference of the absolute value of |AIB – TSB| and the absolute value of |TcB – TSB| was 0.77 mg/dL

(<1 mg/dL), 95% confidence interval were 0.60–0.95 mg/dL, the accuracy of AIB was not inferior to the TcB with all data. The accuracy of AIB were not inferior to the TcB in the different subgroups of the hours after birth, gestational age, and the detection period of daytime as well. The mean difference of the absolute value of |AIB – TSB| and the absolute value of |TcB – TSB| was 1.47 mg/dL, 95% confidence interval were 1.08–1.87 mg/dL, the accuracy of AIB was inferior to the TcB in the subgroup of the detection period of night (n=64). There was good correlation (*r*=0.784) and strong consistency [96.4% (238/247) samples lay within the 95% limits of agreement (–4.75–5.71 mg/dL)] between AIB and TSB of all data. There were good correlation and strong consistency between AIB and TSB in the different subgroups of smartphone, the detection area, the hours after birth and gestational age as well. The correlation (*r*=0.924) and consistency (98.4%) between AIB and TSB of the detection period of daytime were obviously better than the detection period of night (*r*=0.727, 87.5%). The mean difference of the absolute value of |visual value – TSB| and the absolute value of |AIB – TSB| was 2.13 mg/dL, 95% CI: 1.68–2.58 mg/dL. The accuracy of AIB was significantly superior to visual value. The area under the ROC curves of AIB for prediction of TSB >10, >15, >20 mg/dL were 0.94, 0.89, 0.84, the sensitivity were 93%, 75%, 50%, the specificity were 85%, 87%, 88%, respectively.

Conclusions: The accuracy of AIB was not inferior to the TcB, and significantly superior to visual value. There were good correlation and strong consistency between AIB and TSB. The different hours after birth, gestational age, smartphone and the detection area had little effects on the accuracy of AIB, the correlation and consistency between AIB and TSB. There were greater effects on AIB during the detection period of night. The better detection period of AIB was daytime with bright natural light.

Keywords: Jaundice; neonatal; smartphone application; automated image-based bilirubin

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