

Non-Invasive Hemoglobin Estimation in Patients with β -Thalassemia Major

Al-Khabori M.K., Al-Riyami A.Z., Al-Huneini M., Al Farsi K., Al-Hashim A., Al-Kemyani N., Mohsin H.M., Daar S. *Blood* (ASH Annual Meeting Abstracts) 2012 120: Abstract 5179

Introduction

Patients with β -thalassemia major receive regular blood transfusions. Non-invasive hemoglobin (Hb) estimation may simplify their care. Masimo Pronto-7 Pulse CO-oximetry device is used to non-invasively estimate the hemoglobin level but has not been previously validated in this group of patients. The primary objective of this study was to validate the pulse CO-oximetry based hemoglobin estimation in children and adults with thalassemia major.

Methods

We conducted a prospective observational study on 108 children and adults with thalassemia major attending the daycare thalassemia center of a tertiary care hospital over 6 weeks. We estimated a spot Hemoglobin (SpHb) level using Masimo Pronto-7 Pulse CO-oximetry device (two measurements per patient) and compared it to a venous sample Hb (Reference Hemoglobin; Ref Hb) measured using Abbott CELL-DYN Sapphire hematology analyzer. We calculated Pearson correlation coefficient and coefficient of determination (R^2). The multivariable linear regression model of predicting the estimation differences included age, gender, weight, height, blood pressure and reference hemoglobin.

Results

We enrolled 108 patients (54 males, 54 females) with a mean age of 21.6 years (SD 7.3; 2.5–38). There were 156 estimation episodes. The mean Ref Hb and SpHb were 9.4 g/dL (SD 0.9; 7.1–12.3) and 11.1 g/dL (SD 1.2; 7.5–14.7) respectively. The correlation coefficient between the SpHb and Ref Hb was 0.49 ($R^2 = 24\%$) with a mean difference of 1.7 g/dL (SD 1.1; -1.2 to 4.3). In the multivariable model, Ref Hb level was the only statistically significant predictor of the difference in measurement ($p = 0.002$). There was a strong correlation between the two CO-oximetry Hb measurements (correlation coefficient 0.70, $R^2 = 50\%$).

Conclusions

Our results indicate that Masimo Pronto-7 Pulse CO-oximetry device overestimates the hemoglobin level and it cannot be recommended for patients with thalassemia major. Larger prospective studies are needed to confirm these results.