ARE ANALYTICAL DIFFERENCES THE REASON FOR DISCREPANCIES BETWEEN THE ABSOLUTE VALUES OF RETINOL AND RETINOL-BINDING PROTEIN IN HUMAN SERUM?

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BACKGROUND

The WHO estimates that vitamin A (VA) deficiency globally affects over 190 million preschool age children. A reliable measurement of the VA status is thus essential to determine the public health relevance of VA deficiency and to assess the impact of interventions aiming to reduce VA deficiency. The currently most common VA assessment method is serum retinol by HPLC, but the measurement of retinol-binding protein (RBP) is gaining importance. It can be measured much more efficiently (see pictures below) and easily combined with indicators for the iron and infectious status. Yet, to date, there is still uncertainty whether the absolute values of both measurements are directly comparable, and varying thresholds for defining VA deficiency are proposed.

AIMS/METHODS

To test whether the discrepancy between these two biomarkers is due to lower saturation of RBP with retinol or due to analytical differences. We minimized the latter by using the same calibrators for the retinol by HPLC and RBP ELISA measurement; 128 randomly selected samples from children under 5 of four countries (Cambodia, India, Cote d 'Ivoire, Senegal) were analyzed in parallel, using the same calibrators (Quality control sera from the CDC/Atlanta).

RESULTS

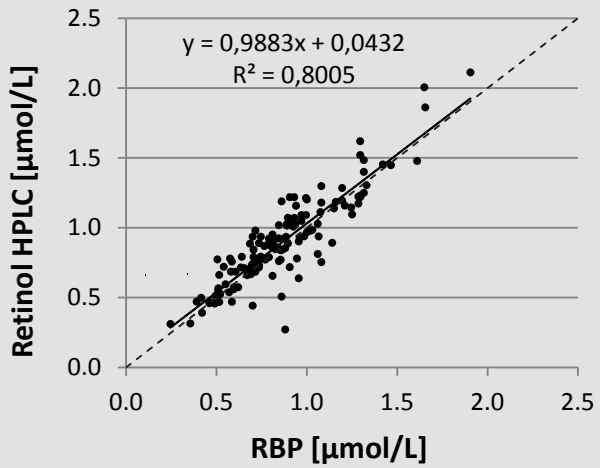
In each of the countries the mean concentration of RBP vs. retinol in umol/L was nearly the same (Cambodia 0.94 vs. 0.95, India 0.87 vs. 0.86, Côte d'Ivoire 0.72 vs. 0.77 , Senegal 0.97 vs. 1.04). Figure 1 shows the overall correlation plot and the regression equation, with highly comparable results. When applying the standard cut-off of 0.7 umol/L for moderate VA deficiency, the sensitivity and specificity of RBP were 81% and 91%, respectively

Bibliography
Erhardt JG, Estes JE, Pfeiffer CM, Biesalski HK, Craft NE. Combined measurement of ferritin, soluble transferrin receptor (sTfR), retinol binding protein (RBP) and c-reactive protein (CRP) by an inexpensive, sensitive and simple sandwich ELISA technique. J Nutr. 2004 Nov;134(11):3127-32.

CONCLUSIONS

The results of this study indicate that the often observed differences between the absolute values of RBP and retinol are caused by analytical differences and can be minimized by using the same calibrators for both methods. This calls for caution prior to establishing separate thresholds for RBP and retinol, as this may induce confusion within the program managers implementing VA interventions in developing countries.

Figure 1: Correlation plot of RBP against retinol

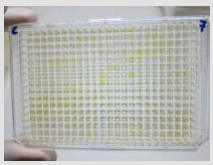


Pictures for blood collection and high efficient measurement procedure of RBP


Material for collection of blood from the finger (lancets, tubes, pipettes, labels, storage box, manual centrifuge if no electricity is available)


Collection of blood from the finger


Storage of plasma samples in 0.2 mL PCR tubes (they need only a quarter of the usual volume and can be directly used in the pipetting machine)


Result of the measurement in a 384 well Plate

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