

Correspondence of Hemoglobin Values Obtained by a Noninvasive, Cutaneous-Contact Method with Values Obtained by Conventional Methods from Whole Blood Samples in a Guatemalan Field Setting. Crowley C., Montenegro-Bethancourt G., Arriaga C., Solomons N.W., Schumann K. *Food and Nutrition Bulletin*, 2010; 31(4): 503-512.

Background

Anemia is a widespread public health issue, conventionally diagnosed by analyzing the hemoglobin concentration in whole blood samples. Aspects of safety, comfort, and cultural acceptability would be obviated if reliable, noninvasive anemia screening were available. Objective: To determine day-to-day variations within subjects in hemoglobin measurements and the correspondence of hemoglobin values obtained by a noninvasive, photometric, cutaneous-contact method with values obtained by conventional methods from blood samples.

Methods

The hemoglobin level was determined in 40 pregnant women from the Guatemalan coastal plain (low values) and 40 men from the highlands (high values). Hemoglobin concentrations (g/dl) were measured in an automated cell counter and, in parallel, estimated with the use of the Rad-87™ Rainbow pulse CO-Oximeter placed over the nail bed of the ring finger.

Results

The mean value for invasively determined hemoglobin was 13.5 g/dl, as compared with 12.2 and 12.1 g/dl for the noninvasive nail-bed estimate at 10 and 5 minutes, respectively. Measurements using the noninvasive technology were highly stable within days and from day to day. The noninvasive screening method showed satisfactory sensitivity and specificity at hemoglobin concentrations of < 12.0 g/dl (cutoff value for nonpregnant women) and < 13.0 g/dl (cutoff value for adult men). Diagnostic discrimination was poorer for the lower cutoff criteria; the anemia cutoff values were < 11.5 g/dl for school-age children and < 11.0 g/dl for pregnant women and children under 5 years of age.

Conclusions

Noninvasive hemoglobin screening shows considerable promise, although improvement of sensitivity and specificity in the anemic range and determination periods of less than 10 minutes are desirable.