Evaluation of a Pulse CO-Oximeter for Non-invasive Hemoglobin Measurement in Adult Population in Rural India.

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Introduction

Hemoglobin measurement is routine for detection of anemia. Noninvasive Hemoglobin measurement would be very convenient in an outpatient setting and for patients undergoing surgery, where immediate results are required for further management in a Medical/Surgical Camp where hundreds of patients are seen in a day. We evaluated the accuracy of noninvasive hemoglobin measurement by Pulse CO-Oximetry (SpHb) compared to laboratory analysis of blood in patients attending 37th annual Medical and Surgical Camp from 2nd to 22nd January 2011, in Bidada, a village very remotely located in India.

Methods

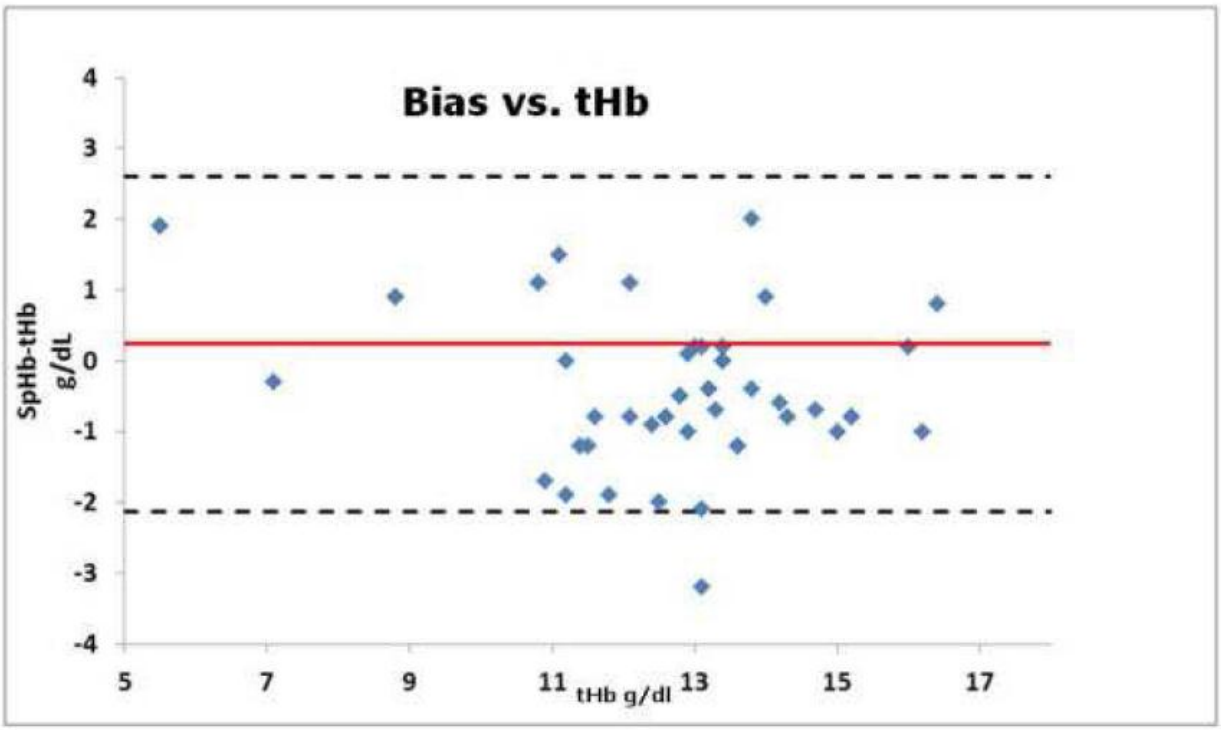
After approval by the ethics committee of Bidada Hospital, 40 patients were randomly selected during two days when the investigators were volunteering their services, were enrolled in the study. The patients were 23 females (mean age 45 years, range 18 to 76 years) and 17 males (mean age 40 years, range 20 to 65 years). A reusable finger sensor (adult DCI SC360; rev E) connected to a Radical-7 Pulse Co-Oximeter (SET software version 7.6.0.4) was placed on subject's index, middle or ring finger covered with light shielding bag and the SpHb value was recorded. Patient's venous blood was also drawn for analysis of Complete Blood Count including hemoglobin using Erba chem.-5 plus semiautomated chemistry analyzer (Transasia, Mumbai, India). The mean bias, precision & upper and lower limits of agreement were calculated for all SpHb-tHb data pairs.

Results

A total of 40 paired measurements were collected for comparison of spot check hemoglobin values (SpHb) with the values obtained from invasive blood draws. SpHb values, ranged from 7 to 16.4 g/dL and tHb ranged from 6.1 to 16.4 g/dL. The bias and precision between the two values were 0.2+/- 1.2 g/dL respectively.

Conclusion

Non-invasive hemoglobin measurement by Pulse CO-Oximetry gives reliable information compared to the invasive method. Furthermore, SpHb eliminates the bio-hazard risks of venipuncture and blood handling and very convenient to use in a rural camp setting.


Bias vs. tHb
SpHb-tHb g/dL
4
3
2
1
0
-1
-2
-3
-4
5
7
9
11
13
15
17
tHb g/dl