

Validation of a hemoglobinometer for use in outdoor blood donation camps

Sir,

Hemoglobin estimation of blood donors is performed to prevent anemic donors from donating blood and ensuring a good quality of packed red blood cell component. Several devices are presently available for hemoglobin estimation of blood donors as a screening test before blood donation.^[1] The desirable features of a device intended for mass screening include high accuracy, precision, rapidity, and ease of operation.^[2]

In our part of country, there is a wide variation in temperature conditions. Thus, any device which has to be used for hemoglobin screening in outdoor blood donation camps should be able to give its optimum performance even at highest temperature range in that region. In this study, we have compared the performance of HemoCue Hb301 System at indoor temperatures (18–22°C) and outdoor temperatures (>35°C) in the month of July 2014.

Ethylenediaminetetraacetic acid anticoagulated venous samples of 100 patients which were sent for hemoglobin estimation were tested by manual cyanmethemoglobin method which was standardized using commercially available standards (Span diagnostics, Surat, India) as a routine testing method. For comparing the accuracy, these were tested by HemoCue Hb301 System both at in the air-conditioned departmental laboratory (T1) and at outdoor work station (T2) by the same operator. The samples initially placed at T1 for 1 h were tested by cyanmethemoglobin method and HemoCue Hb301 System. These were then kept at T2 for 1 h before retesting with HemoCue Hb301 System after ensuring their physical integrity. For comparing the precision, 5 samples tested by cyanmethemoglobin method were taken. Each was retested 10 times by HemoCue Hb301 System both at T1 and T2.

The results obtained are summarized in Figure 1 and Table 1.

HemoCue Hb301 is a quantitative point of care system based on photometric detection of hemoglobin level. A previous

study has evaluated its performance against previous HemoCueHb 201+ system in diagnosing anemia of pregnancy and found it sufficiently precise and accurate.^[3] The system is designed to operate at 10–40°C^[4] but there are no studies to the best of our knowledge, for evaluating its performance at varied temperature conditions. The device has shown good accuracy at both T1 (correlation coefficient $r = 0.903$) as well as T2 (correlation coefficient $r = 0.893$). The precision of measurement was also good at both the temperatures with coefficient of variation ranging from 0.060 to 0.094 at T1 and from 0.041 to 0.085 at T2. Since the process of validation was performed before installation of the equipment in the department, it also allowed a chance for hands-on training of the technical staff. We conclude that HemoCue Hb301 system is adequately apt for both routine uses and use in outdoor blood donation camps.

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Conflicts of interest

There are no conflicts of interest.

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Table 1: Results of precision determination for 10 replicated performed on 5 patient samples at T1 and T2

Sample number	Cyanmeth-hemoglobin value	T1			T2		
		Mean	SD	CV	Mean	SD	CV
1	8.2	8.90	0.842	0.094	8.56	0.723	0.085
2	10.4	10.62	0.878	0.086	11.36	0.910	0.080
3	12.8	12.94	1.032	0.080	12.82	0.719	0.056
4	14.6	14.66	0.882	0.060	14.42	0.601	0.041
5	15.0	15.04	1.006	0.065	15.16	0.835	0.055

All hemoglobin values in g/dl. SD: Standard deviation, CV: Coefficient of variation

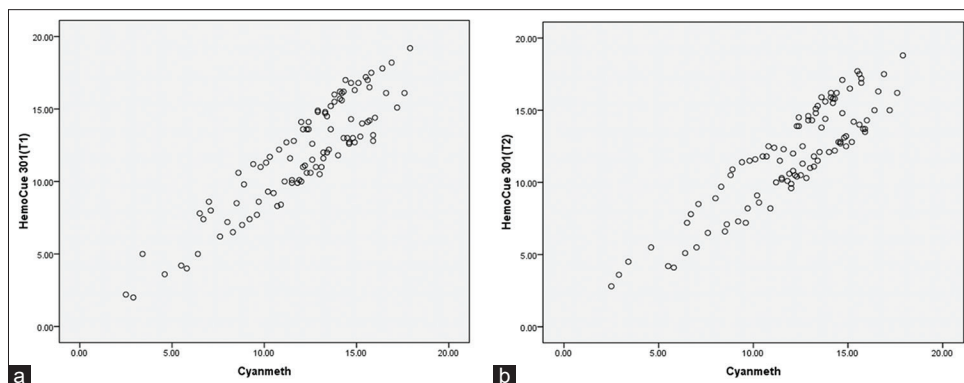



Figure 1: Correlation of hemoglobin values between Cyanmeth hemoglobin method and HemoCueHb 301 system at (a) T1 and (b) T2

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