

Use Of Digital Haemoglobin (TAMIACS) For Measuring Haemoglobin

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Abstract: **Background:** Hemoglobin estimation serves as a critical screening test for blood donors, ensuring their eligibility and safety. While various methods exist for this purpose, each approach carries its own set of advantages and disadvantages. Among these methods, digital hemoglobinometer stands out as a highly reliable, sophisticated, and well-suited choice, particularly within the context of blood donation centers (1). This study aimed to assess the performance of the TAMIACS digital hemoglobin analyzer by comparing it to the Benesphera H31 cell counter, a well-established and highly accurate method for hemoglobin testing. **Material And Methods:** Conducted at a tertiary Indian Red cross society .Nadiad.. from July 2023 to september 2023, this study involved 250 donor . The data obtained from the TAMIACS digital hemoglobin analyzer were meticulously compared with those from the Benesphere H31 cell counter. **Result:** Out of the 250 donors, the vast majority (247) were male, while 3 were female. The mean hemoglobin value obtained from the TAMIACS Digital haemoglobin analyzer (mean 14.4 g/dl) was slightly higher by 0.4 g/dl when compared to the reference value from the Benesphera H 31 cell counter (mean 14.2 g/dl). However, this difference was not statistically significant ($P > 0.05$). Moreover, in comparison to the cell counter, the TAMIACS analyzer proved to be cost-effective while maintaining a high level of sensitivity and specificity, both exceeding 95%. The R square value, which stood at 0.9987, indicates a high level of precision. **Conclusion:** In conclusion, the digital hemoglobinometer, TAMIACS, has demonstrated its capacity to yield results on par with those of the cell counter. Moreover, it stands out as a cost-effective alternative. This study reaffirms the reliability and cost-effectiveness of the TAMIACS digital hemoglobin analyzer, making it an excellent choice for hemoglobin estimation in blood donation setups. [Shah A Natl J Integr Res Med, 2023; 14(4):25-26, Published on Dated: 8/07/2023]

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Introduction: Pre-donation hemoglobin screening is a vital initial step in the selection of blood donors, primarily aimed at preventing the collection of blood from individuals with anemia. Blood donors typically represent the general population, making hemoglobin estimation not only crucial for donor eligibility but also for assessing the prevalence of anemia within this group.

Therefore, it is imperative to have an accurate and dependable method for determining hemoglobin levels.

In accordance with the Indian Drugs and Cosmetics Act of 1940, the minimum acceptable hemoglobin (Hb) level for blood donation is set at 12.5 g/dl or a hematocrit (Hct) of 38% for both males and females.

This criterion applies to various blood donation procedures, including single donor platelet apheresis, where hemoglobin levels are strictly assessed alongside other criteria, such as

transfusion-transmissible infections (TTI) screening. Consequently, blood samples collected in EDTA tubes are commonly used for complete blood count (CBC) testing in all donors. Numerous manufacturers offer digital hemoglobinometers, known for their user-friendliness, sophistication, and suitability for blood bank staff.(4)

This study focuses on evaluating one such device, the TAMIACS digital hemoglobin analyzer, and comparing its performance to readings from a Benesphera H31 hematology cell counter, a widely recognized and highly accurate method for hemoglobin testing.

Material & Methods: This study involved 250 single donor platelet (SDP) donors and was conducted at a tertiary cancer care center from July 2023 to September 2023, following approvals from the Drugs Controller General of India (DCGI) and the Institutional Review Board. Out of these donors, 247 were male, and 3 were female. The study utilized samples already collected for TTI

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testing, blood grouping, and CBC analysis. The same samples were immediately employed for hemoglobin measurement after their use in the cell counter.

Results: While many studies typically compare capillary blood and venous blood for digital hemoglobinometers, this study used venous blood previously tested in a cell counter, thus providing a direct evaluation of the TAMIACS device.

Hemoglobin values ranged from 7.6 g/dl to 19.8 g/dl. The mean hemoglobin value obtained from the TAMIACS analyzer (mean 14.4 g/dl) was slightly higher by 0.4 g/dl compared to the reference value from the Benesphera H31 cell counter (mean 14.4 g/dl).

However, this difference was not statistically significant ($P > 0.05$). The TAMIACS device demonstrated cost-effectiveness with high sensitivity and specificity, both exceeding 95%.

An R-square value of 0.9987 indicated a high level of precision. The 95% Confidence Intervals and the limit of agreement were found to be between -0.4 to 0.4.

Discussion: An accurate hemoglobin screening method is essential for blood collection, enabling the acceptance of suitable donors while preventing inappropriate deferrals. Any new method or device introduced for hemoglobin screening should be time-efficient, cost-effective, and validated against established cell counters or direct cyanmethemoglobin method (2).

Capillary blood, commonly used for hemoglobin estimation, is highly operator-dependent, resulting in lower precision and reduced donor acceptance due to associated pain and discomfort.(3)

Although obtaining venous samples for accuracy is ideal, it is not always pragmatic as it subjects donors to additional vein punctures, jeopardizing potential phlebotomy sites and increasing the volume of blood drawn.

Thus, the study focused on evaluating the Tamiacs hemoglobinometer using SDP donor samples. The TAMIACShemoglobinometer, evaluated here for the first time, proved to be a

handy, lightweight, and easy-to-use device based on absorbance photometric principles.

It operates on battery power, offers a measuring range of 0-25g/dL, provides rapid results within 10 seconds, and requires only a 10-microliter sample.

The reference method used, the Benesphera H31, is also based on photometric absorbance principles and is widely accepted as a standard in many studies.

Previous studies have suggested inaccuracies in some point-of-care hemoglobin screening methods when using capillary blood.

In economically restricted settings like India, devices like the Tamiacs Hemoglobin analyzer can be valuable for confirming donor deferrals. Other studies have also explored various methods for hemoglobin estimation and highlighted their pros and cons.

Conclusion: In conclusion, the TAMIACS digital hemoglobinometer produced comparable results to the cell counter, demonstrating its reliability.

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