Evaluation of A Digital Hemoglobin Analyser In Comparison With Hematology Cell Counter

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Abstract: Background: Haemoglobin estimation is an important screening test for blood donor. Despite many methods available, each method has some advantages and disadvantages. Hemoglobin estimation by digital hemoglobinometre proved to be a very reliable, sophisticated, appropriate and ideal especially for a blood donation setup and also reliable in comparison to hematology analyser. Materials and Methods: A study of 250 Single donor platelet donors to evaluate a digital haemoglobin analyser- Dolphin was done in a tertiary cancer care centre from August 2019 to October 2019.and data were compared to sysmec KX 21 cell counter which is one of the most accurate method for haemoglobin testing. Results: Out of 250 donors 247 were male and 3 were female. Mean value of Dolhin (mean 14.8 g/dl) was higher by 0.6 compared to reference (mean 14.2 g/dl) but not statistically significant (P > 0.05). In comparison to cell counter Dolphin proved to be the cost effective with sensitivity and specificity more than 93%.. R square value is 0.9897 which indicates high precision. Conclusion: Digital hemoglobinometre – Dolphin gives comparable results to cell counter and hence proved to be reliable and cost effective. [Kusimgar R Natl J Integr Res Med, 2019; 10(5):91-92]

Key Words: Haemoglobin, sophisticated, single donor platelet

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Introduction: Pre-donation hemoglobin screening is among the first and foremost tests done for blood donor selection with the main intention of preventing blood collection from an anemic donor. Blood donors represent the normal population hence haemoglobin estimation in blood donor also analyse the prevelance of anemia in the study population. It is therefore essential, that there should be an accurate and reliable method for hemoglobin determination. According to the Indian Drugs and Cosmetics Act, 1940 for blood donation, the minimum acceptable hemoglobin (Hb) is 12.5 g/dl or hematocrit (Hct) of 38% for both males and females.[1] Single donor platelet apheresis is one of the specialised procedure in which also the selection criterias mandate haemoglobin and usually all the blood bank follows the prior testing of TTI hence sample collection done in EDTA tube also and CBC testing for all donors done. Number of manufacturers provide digital haemoglobinometre which is one of the most user friendly device for blood bank staff which provide sophistication also. Here in this study we have evaluated one of such devices-Dolhin and compare it to hematology cell counter readings.

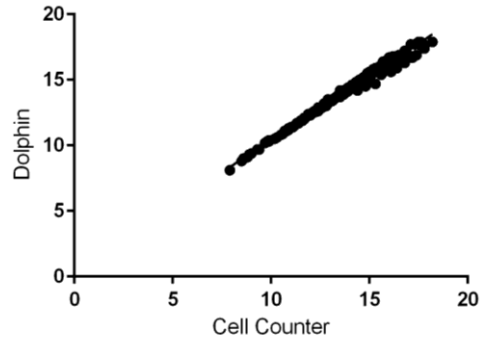
Materials and Methods: A study of 250 SDP donors (single Donor Plasma) to evaluate a digital haemoglobin analyser - "Dolphin" was done in a tertiary cancer care centre from August 2019 to October 2019 after getting the permission from DCGI and Institutional review board, and data were compared to sysmec KX 21 hematology cell counter which is one of the most accurate method for haemoglobin testing. Out of 250 donors 247 were male and 3 were female. Samples were already collected to test TTI, blood group and CBC and the same sample were used immediately once it run in cell counter

Results Usually most of the study of such kind, evaluate between capillary blood and venous blood as for digital hemoglobinometre use mainly capillary blood but here in our study we evaluate this device by using venous blood which was prior used in cell counter, hence given direct evaluation of the device. The values for haemoglobin ranges from 7.6g/dl to 19.8 g/dl. Mean value of Dolhin (mean 14.8 g/dl) was higher by 0.6 compared to reference (mean 14.2 g/dl) but not statistically significant (P > 0.05).

Dolphin proved to be cost effective with very good sensitivity and specificity both more than 93%. R square value is 0.9897 which indicates high precision (Figure 1). Study shows 95% Confidence Intervals and limit of agreement is between -0.4 to 0.7.

Discussion: For blood collection an appropriate Hb screening method should be available so as to accept as many suitable donors as possible and to prevent any inappropriate deferrals. Any new method/device to be introduced for Hb screening should save time and expenditure and should be validated against major cell counters or direct cynmethemoglobin method. Capillary blood for

Figure1: Correlation of Dolphin with Cell Counter



Hb estimation of blood donors because it is highly operator dependent with subsequently low precision and it has lower acceptance by donors due to the associated pain and discomfort.

Obtaining Venous sample is a prerequisite for accuracy but is non-pragmatic because it subjects the donor to another venipuncture, jeopardizing a potential phlebotomy site and adding to the volume of blood withdrawn that is the reason just evaluate this device, we have used SDP donor sample. Dolphin hemoglobinometre has been evaluated for the first time so here we have to refer similar study on other devices.Dolphin hemoglobin meter is handy, light weight, very easy to carry, working on absorbance photometric principal. Its battery operated . Measuring range is 0-25g/DL, can give reading within 10 seconds, 10 microlitre sample size needed. The reference method we used is also standard for many studies and time tested based on the same principle of photometric absorbance that KX 21(sysmec). Gómez-Simón et al[2] evaluated the performance of three PHs (HemoCue, STAT-Site MHgb and CompoLab HB system) and attributed the inaccuracy in their performance mainly to the use of capillary blood. Tondon et al[3] also evaluated another device hemocue and concluded that such devices can be used to confirm donor deferral in economically restricted country like India. Chaudhary et el[4] evaluated various method and gave detail insight of various method in his study. Manju et el[5] also opine positively in use of digital hemoglobinometre but different make, the population she used were different than our study. Almost more than 10 years back , Sawant and his coworkers also compare various methods and opine that Hemoglobin colour scale method most suitable for blood donor screening[6]. All these studies describe pros and cos of different method.

Conclusion: Digital hemoglobinometre – Dolphin gives comparable results to cell counter. But in blood bank set up, as only screening is needed, proper quality controlled $cuso_4$ method still remains , method of choice due to its cost effectiveness

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