

The Agreement between Haematological Indices Obtained from Two Different Laboratories

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Introduction: It is challenging when laboratory investigations do not match the clinical impression of a patient's condition. When the investigations are repeated, significant intra and inter laboratory variations are seen causing diagnostic confusions.

Objectives: To evaluate the agreement between the haemoglobin concentrations (Hb) and between the haematocrits (Hct) obtained from two laboratories using two different methods.

Method: Consecutive pregnant women ($n = 350$), with gestations between 12 to 20 weeks, presenting to the Academic Obstetric Unit for antenatal care from 10 November 2014 to 13 January 2015 had their Hb and Hct measured by flow-cytometry and hydro-dynamic focusing methods at two different laboratories. The agreement between the Hb and Hct values obtained from the two laboratories were assessed by comparison of means, Pearson's correlation, and the calculation of the limits of agreement and the clinical limits of indifference by using Bland Altman's and Indrayan's methods respectively. The Statistical Package for Social Sciences (SPSS version 20) was used for data analysis.

Results: No significant differences were seen between the mean Hb values and between the mean haematocrit values obtained from the two laboratories. Strong, positive correlations were seen between the Hb values as well as between the haematocrit values obtained from the two laboratories ($r = 0.86$, $p < 0.01$ and $r = 0.83$, $p < 0.01$ respectively). The limits of agreement and the clinical limits of indifference between the Hb as well as between the haematocrit values obtained from the two laboratories were satisfactory (95% CI ranging from -0.99 g/dl to $+0.99$ g/dl and -3.36% to $+3.00\%$ respectively), but individual differences of $> 10\%$ were seen in 6.6% of results.

Discussion: Although the agreement between haematological indices obtained from different laboratories have been shown to be unsatisfactory in the past [1], they currently appear to have better agreement. This could be due to improvements in the techniques currently used in different laboratories to measure haematological indices as well as the adoption of quality assurance measures. Although comparisons of the means of Hb and means of Hct obtained by two laboratories demonstrated near perfect agreement, and very good correlations, these are not reliable methods of assessing agreement between two measurements of the same parameter [2, 3]. Although the limits of agreement were narrow, assessment of the clinical limits of indifference demonstrated that, significant differences in the results of the two laboratories in the same sample of blood. Therefore the importance of repeating the FBC as well as taking the clinical picture into consideration needs to be stressed. Indrayan's method we used enabled us the assessment of small and big individual differences as well as a proportional bias, which are not possible with the Bland Altman method. The consideration that a difference of Hb $> 10\%$ could affect the clinical management of chronic anemia or acute blood loss while a difference of $> 10\%$ in haematocrit could affect the clinical management of other conditions such as dengue haemorrhagic fever, was the basis for the setting of these clinical limits.

Conclusion: Although there was good agreement between the Hb values as well as between the haematocrit values obtained from the two laboratories, individual differences of $>10\%$ were seen in 6.6% of cases.