Evaluation of the diagnostic reliability of different RBC indices and formulas in the differentiation of the β-thalassaemia minor from iron deficiency in Palestinian population

M. SIRDAH*, I. TARAZI†, E. AL NAJJAR†, R. AL HADDAD†

*Biology Department, Al Azhar University, Gaza, Palestine
†Thalassaemia and haemophilia centre, Palestine Avenir foundation, Gaza, Palestine

Correspondence:
Mahmoud Sirdah, Biology Department, Al Azhar University-Gaza, PO Box 1277 Gaza, Palestine.
Tel.: +970599481194;
Fax: +97082823180;
E-mail: msirdah@hotmail.com

doi:10.1111/j.1751-553X.2007.00966.x

Received 14 January 2007; accepted for publication 3 July 2007

Keywords
Differentiation, discrimination, iron deficiency, RBC indices, β-thalassaemia

SUMMARY

β-thalassaemia minor and iron deficiency are the most common causes of microcytosis and/or hypochromasia. The present study evaluates the diagnostic reliability of different RBC indices and formulas, as well as our proposed formula, in the differentiation of the β-thalassaemia minor from iron deficiency in Palestinian population. Complete blood count (CBC) parameters of 2196 certainly diagnosed (1272 β-thalassaemia minor and 924 iron deficiency) samples were used to evaluate the following indices and formulas: Bessman index (RDW), Mentzer formula (MCV/RBC), England and Fraser formula (MCV − RBC − 5 × Hb − 3.4), Shine and Lal formula ($MCV^2 \times MCH/100$), Ehsani formula (MCV − 10 × RBC), Srivastava formula (MCH/RBC), Green and King formula ($MCV^2 \times RDW/Hb \times 100$), red distribution width index RDWI (RDW × MCV/RBC), RDW/RBC, as well as our formula (MCV − RBC − 3 × Hb). For each index and formula, the receiver operative characteristic (ROC) curve was constructed to calculate the area under the curve (AUC), in addition, sensitivity, specificity, and likelihood ratios were calculated. No significant differences were reported between our formula, Green-King formula and the RDWI ($P > 0.05$) in discriminating β-thalassaemia minor from iron deficiency (AUC = 0.914, 0.909 and 0.907 respectively). However, the three indices and formula showed the highest efficiencies and they were significantly ($P < 0.05$) better than the others in the discrimination efficiency .It was concluded that our formula, Green–King formula and the RDWI provided the highest reliabilities in differentiating β-thalassaemia minor from iron deficiency in Palestinian population while Bessman index was poor and ineffective for that purpose.