The Validity of Screening for Nutritional Deficiencies of Iron and Cobalamin using Fresh Capillary Blood Darkfield Microscopy
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Aim: The purpose of this study was to investigate the validity of the Fresh Capillary Blood Darkfield Microscopy (FCB-DM) technique in screening for nutritional deficiencies of iron and cobalamin. The training and practice of FCB-DM (also termed 'live blood screening') is currently used by clinicians as a point-of-care screening tool for haematology status, including nutritional deficiencies. Despite its popularity in the clinical setting, there is a paucity of scientific research into the use of this technique with no research to date investigating the use of FCB-DM as a screening tool for nutritional deficiencies.

Method: FCB-DM screenings were performed on 29 consenting participants who were likely to be deficient in iron or cobalamin. The FCB-DM screenings were photographed to permit a quantitative analysis of cell size and morphology. The FCB-DM parameters assessed are listed in Tables 1 and 2 and shown in Figures 1, 2 and 3. Each participant provided a sample of venous blood soon after the FCB-DM screening for diagnostic pathology testing. The researcher was blinded to the pathology results until all FCB-DM data analysis was complete. Data from the FCB-DM screenings were correlated with Full Blood Count, Iron Studies, Homocysteine (HCY), Methylmalonic Acid (MMA) and Active B12.

Results: The FCB-DM parameter that showed the strongest correlation with serum ferritin was elliptocytosis (Table 1), which was also the only FCB-DM marker to show a significant correlation with TIBC. Elliptocytosis had a sensitivity and specificity of 0.87 and 0.60, respectively, for the detection of low iron (ferritin <15 µg/L, n=8). FCB-DM parameters annulocytosis and microcytosis were also found to have correlations with serum ferritin. HCY was found to significantly correlate with FCB-DM parameter microcytosis, showing a strong correlation (Table 2). MMA and HCY were both found to correlate with anisocytosis. The FCB-DM mean RBC diameter was calculated from a 500 RBC count for each participant. A strong, significant correlation was found between the pathology MCV and FCB-DM mean RBC diameter (n=29, r=0.577, p<0.01), as illustrated in Figure 4.

Conclusions: The results of this study suggest that elliptocytosis is a valid marker of low iron. This supports findings from previous haematological studies of blood morphology that a significant relationship exists between elliptocytosis and low iron according to diagnostic tests. Limited support was found for other FCB-DM parameters and further research using a larger sample is required to ascertain their validity. The FCB-DM parameters of hypersegmented neutrophils and oval macrocytes were found to be poor markers of cobalamin deficiency, which agreed with previous studies, however, may have been due to the small sample of clinically deficient participants (n=4).

References:

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