Predictive Value of MCV/RBC Count Ratio to Discriminate between Iron Deficiency Anaemia and Beta Thalassaemia Trait

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Abstract

Aim and background: Two forms of hypochromicmicrocytic anaemia i.e. iron deficiency and B-thalassaemia trait are common in our society. This study reports the prevalence of iron deficiency anaemia and B-thalassaemia trait and predictive value of MCV/RBC count ratio to discriminate between two.
Methods: Venous blood was taken from 299 students of Karachi Medical & Dental College and Ziauddin Medical University in Na2 EDTA and analyzed by semi-automated Sysmex K-1000 haematology analyzer. MCV/RBC count ratio was used to discriminate between iron deficiency and g-thalassaemia trait and >14% was marked as iron deficiency. Hb electrophoresis was used as gold standard test for confirmation. Serum iron and TIBC was performed to confirm iron deficiency anaemia.
Results: Iron deficiency was found in 9% while £-thalassaemia was seen in 3% students. MCV/RBC count ratio showed a positive predictive value of 91%.
Conclusions: In areas where iron deficiency anaemia and B-thalassaemia trait are common, MCV/RBC count ratio can be used to screen out g-thalassaemia trait. (JPMA 48:18, 1998).

Introduction

Most individuals with hypochromic microcytic anaemia may either have iron deficiency or B-thalassaernia trait. In Pakistan, 60% children aged 6-60 months and 39% adolescents suffer from iron deficiency anaemia[1,2], It is prevalent in all age groups particularly in underprivileged lower socio-economic class[3] . Iron deficiency anaemia in well-nourished adolescents is due to accelerated physical growth in both sexes and menstrual loss in girls[4,5]. B-thalassaemia carrier rate varies from 4-8%, thalassaemia trait should therefore be differentiated from iron deficiency to prevent unnecessaiy iron therapy and for genetic counselling to prevent B-thalassaernia[6,7]. This study reports prevalence of two forms of hypochromic microcytic anaemia and predictive value of MCVIRBC count ratio to discriminate B-thalassaemia minor from iron deficiency.

Subjects and Methods

Two hundred and ninety nine apparently healthy students of both sexes from Karachi Medical and Dental College and Ziauddin Medical University were included in this study. After an informed consent, l.5c.c. venous blood was taken indi-sodium ethylene diamine tetra acetic acid (Na2 EDTA) at a concentration of 1.5 mg/mi and analyzed by semi-automated Sysmex K-l000 haematology analyzer (Toa Electronics Japan) for haematoiogical indices. Peripheral blood smears were examined for RBC morphology. Serum iron and total iron binding capacity was done to confirm iron deficiency[8]. Haemoglobin electrophoresis was done using cellulose acetate electiophoresis at a pH of 8.9[9] and

different bands of haemoglobin were quantified by densitometry for the diagnosis of thalassaemia minor. A mean corpuscular volume (MCV) of less than 76 fi and a mean corpuscular haemoglobin of less than 26 pg were taken as cut off value for diagnosis of hypochroniic microcytic anaemia. MCV/RBC count ratio was used to discriminate iron deficiency anaemia from thalassaemia minor[10]. All abnormal findings were rechecked to validate the findings, predictive value of MCV/RBC count ratio was determined to assess its usefulness in differcntiating two types of hypochromic microcytic anaemia.

Results

Of 299 students, 188 were females and 111 males whose ages ranged between 18-23 years. Hypochromic microcytic anaemia was found in 38 students (6 males and 32 females). Iron deficiency as a soul cause of hypochromic microcv tic anaemia was seen in 27 students (26 females. 1 male) who had MCV/RBC count ratio more than 14. Eleven students had MCVIRBC count ratio less than 14; B-thalassaemia trait was confirmed in 10 students (4 males and 6 females). One out of 11 students was incidentally found to have Hb H disease.

Discussion

Nine percent students had iron deficiency anaemia. This figure is low as compared to those reported by Pakistan Medical Research Council in National Health Survey of Pakistan 1990-1994, where 33% females and 15.3% males aged 15-24 years suffer from iron deficiency anaemia in uthan area (unpublished data). The reason behind this difference may be better nourishment and awareness among students. The prevalence of B-thalassaemia trait (3.3%) detected in this study was compatible with those reported from northern areas of Pakistan[6]. Iron deficiency anaemia and B-thalassaemia trait was discriminated successfully by using MCV/RBC count ratio. It showed a positive predictive value of 91% and was found very convenient and inexpensive for screening of B-thalassaemia in a highly prevalent area. To discriminate the two forms of hypocbromic microcytic anaemia some algorithms are used in other studies but they either lack simplicity[11] or require some red cell indices, which are obtained on specific haematology analyzers (Technicon Hi haernatology analyzer is available only at CMH Rawalpindi in Paldstan[12]). MCViRBC count ratio used in this study is not only simple to calculate but also these indices can be obtained by most haematology analyzers, so can be used very effectively for screening any where.

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