HAEMOGLOBIN E TRAIT : MICROCYTOSIS AND ERYTHROCYTOSIS

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INTRODUCTION

The widespread use of precise automated cell counters such as the Coulter Model S which directly measures red cell volume has provided a valuable tool for detecting patients with Haemoglobin E (HbE). HbE is one of the most prevalent haemoglobinopathies occurring in South East Asia. A study of fifty six Malays with HbE trait shows that detection of this condition is suggested by mild microcytosis and erythrocytosis made possible by the use of automated cell counters.

This paper highlights the need to consider HbE trait in the presence of mild microcytosis in this region as more laboratories turn to automation in order that persons with this innocuous condition will not be subjected to unnecessary medical examinations and inappropriate treatment.

MATERIALS AND METHODS

Fifty six persons with HbE trait were studied. Eight millilitres of blood was taken from each subject by venepuncture. An aliqout of 4.5 millilitres in EDTA was used to determine the haemoglobin and red cell indices using a Coulter S automated counter. Serum ferritin was measured on the competative binding principles of radioimmunoassay. [1] Haemoglobin analysis consisted of electrophoresis on cellulose acetate Tris-EDTA boric acid (CEAE) buffer pH 8.9 and phosphate buffer pH 6.0. Home made haemolysate consisting of $HbAA_2$ (adult blood) and HbF (cord blood) are used routinely as controls. HbA_2 and other haemoglobin components are quantitated on CEAE. [3] HbF levels are estimated by the alkali resistant method, and its distribution in red cells by the acid elution cytochemical tests. Prepared smears were stained by Wrights stain and assessed by two haematologists independently.

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RESULTS

Persons with HbE trait had normal values for haemoglobin concentration. All had microcytosis (70-77 fl) and half of them had mild erythrocytosis. The MCH were low, MCHC within normal limits and the discriminant function [4] was negative in all subjects. Blood films showed mild anisocytosis, poikilocytosis, microcytosis and target erythrocytes. The relative concentration of HbE is 26.2 - 34% (median 28.8%) of total haemoglobin. The discriminant function [4] was negative.

Serum iron, total iron binding capacity and Serum ferritin levels were in the normal range with half of the subjects having values at the upper limits of normal.

DISCUSSION

The best parameter of the Coulter S in the

TABLE I
HAEMATOLOGIC MANIFESTATIONS OF HbE TRAIT

	Males	Females
Hbgm/dl	15.2 (14.7-15.6)	13.4 (12.47-13.3)
RBC (x10 ^{12}/litre)	6.16 (6.0-6.3)	5.4 (4.8-5.3)
MCV (fl)	74.1 (72.8-75.4)	73.5 (70.6-76.4)
MCH (pg)	24.6 (23.9-25.3)	24.4 (24.0-24.7)
MCHC %	33.1 (32-36)	33.5 (32.0-34.9)
HbE %	28.1 (26.6-30.0)	29.4 (26.3-32)

TABLE II
MORPHOLOGY OF HbE TRAIT

Morphologic Features	% of cases
Microcytosis	100
Hypochromia	10
Target cells	24
Polychromasia	0
Basophilic stippling	0
Reticulocytosis >. 3%	1
Anisocytosis	40
Poikilocytosis	2

screening for Haemoglobin E trait is the MCV. This parameter is directly measured but values are dependent upon the method of calibration. The Coulter S calibrated to measure a commercial control "4C" as in the University Kebangsaan Malaysia gives a normal range of 81 - 91 fl, with a median of 89 fl. A decreased MCV is a sensitive detector of HbE trait with all subjects having an MCV less than 80 fl.

The predictive value of a low MCV for HbE screening is dependent upon the prevalence of other diseases associated with microcytosis. Some of these are iron deficiency, lead poisoning, thalassaemia, sideroblastic and anaemia of chronic disease. Retrospective analysis of patients with low MCV in the above group show certain characteristics. In the presence of a normal haemoglobin minimal microcytosis is seen in early iron deficiency, alpha thalassaemia and HbE trait. Subjects with beta thalassaemia having a more severe microcytosis, the median MCV being 65 femtolitres.

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