A simplified screening strategy for thalassaemia and haemoglobin E in rural communities in south-east Asia

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Abstract

Objective: To evaluate a simple screening strategy for thalassaemia and haemoglobin (Hb) E in a prevention and control programme for thalassaemia in rural communities with limited resources.

Methods: Blood samples from 301 Thai-Khmer participants were screened for thalassaemia and Hb E using a combined modified one-tube osmotic fragility (OF) test and a modified dichlorophenolindophenol (DCIP) precipitation test. Results were evaluated with standard haematological analyses including erythrocyte indices, Hb typing and quantification and polymerase chain reaction (PCR) analysis of alpha-globin and beta-globin genes.

Findings: Participants were divided into four groups according to the results of the combined tests. Altogether, 104 of 301 participants (34.6%) had negative results on both tests; 48 (15.9%) were positive on the OF test but not the DCIP test; 40 (13.3%) were negative on the OF test but positive on DCIP test; and 109 (36.2%) were positive on both tests. No carrier of clinically significant forms of thalassaemia (alphadegrees-thalassaemia, beta-thalassaemia) or Hb E was found among the group that had negative results for both tests. All participants with Hb E had positive DCIP tests. Carriers of alpha(+)-thalassaemia or Hb Constant Spring could generate either positive or negative OF test results but they all had negative DCIP tests. Using both tests as a preliminary screening for the three important groups of carriers gave a sensitivity of 100% and a specificity of 69.8%. The positive predictive value of the combined test was 77.2%. The negative predictive value was 100%. Further evaluation of the screening system by local staff at three community hospitals found a sensitivity of 98.1-100% and a specificity of 65.4-88.4% with positive predictive values of 75.0-86.9% and negative predictive values of 98.1-100%.

Conclusion: A combined test using OF and DCIP could be used as an effective preliminary screening alternative to an electronic blood cell count for identifying carriers with alphadegrees-thalassaemia, beta-thalassaemia and Hb E. The strategy should prove useful for population screening in prevention and control programmes in rural communities in south-east Asia where laboratory facilities and economic resources are limited.

Keywords: thalassemia/diagnosis/blood; hemoglobin E/diagnostic use; osmotic fragility; precipitin tests; 2,6-dichloroindophenol/diagnostic use; erythrocyte indices; carrier state/blood; rural population; Cambodia; Lao People's Democratic Republic; Thailand; South-East Asia

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