Concurrent Inheritance of Deletional $\alpha$-thalassaemia in Malays with HbE Trait

1LK Teh, 1E George, 1ML Lai, 2A Rahimah, 2Z Zubaidah & 1JAMA Tan
1Department of Pathology, Faculty of Medicine and Health Sciences
Universiti Putra Malaysia, Serdang, Selangor, Malaysia
2Haematology Unit, Cancer Research Centre, Institute of Medical Research
Kuala Lumpur
1Department of Molecular Genetics, Faculty of Medicine, University of Malaya

ABSTRACT

Introduction: HbE is the commonest beta haemoglobin (Hb) variant in Southeast Asia. It causes a reduction in synthesis of the beta-globin (FB) chain. Studies indicate HbE co-inherited with $\alpha$-thalassaemia leads to a milder clinical phenotype. This study investigates the concomitant inheritance of $\alpha$-thalassaemia in Malays with HbE. Methods: Four hundred and fourteen (414) blood samples were screened for haemoglobinopathy using primarily the first 3 steps of the BHES ([B] blood counts, blood film; [H], HPLC; [E], electrophoresis; [S], stability]) protocol. Complete blood counts were generated on an automated blood cell analyser, Hb typing with cation exchange high-performance liquid chromatography (HPLC) and Hb electrophoresis at an alkaline pH (pH 8.5). Forty-five (10.9%) were identified as HbE trait and DNA analysis was done for deletional $\alpha$-thalassaemia using a single-tube multiplex-PCR assay. Results: Among the 45 subjects with HbE trait, 4 (8.9%) were found to have alpha-thalassaemia-2 (a') (alpha 3.7 kb deletion) and 1 (2.2%) the alpha-thalassaemia-1 (a") (alpha 20.5 kb deletion) defects respectively. Discussion: These findings show that 11.1% of Malays with HbE inherit alpha-thalassaemia concurrently. The most prevalent interaction found was a double heterozygote for HbE/$\alpha$-thalassaemia 2, followed by HbE/$\alpha$-thalassaemia 1. Conclusion: Molecular screening of deletional $\alpha$-thalassaemia identified its concurrent inheritance in 11.1% of Malays who were HbE carriers. This information will guide genetic counseling and the planning of treatment modalities in patients with HbE alpha-thalassaemia.

Keywords: $\alpha$-thalassaemia, concurrent inheritance, HbE trait, Malays

INTRODUCTION

Genetic defects of haemoglobin synthesis (haemoglobinopathies) are the most common genetic disorders worldwide. It occurs mainly in tropical and subtropical areas. HbE is the commonest beta-globin chain variant in Southeast Asia. The frequency of HbE approaches 60% in many regions of Thailand, Laos and Cambodia. It is also found in Sri Lanka, North Eastern India, Bangladesh, Pakistan, Nepal and Vietnam. In Malaysia, micromapping studies indicate 4% of Malays are carriers of HbE.

In HbE, an alternate splicing site found within exon 1 of the beta-globin gene in the primary mRNA transcript causes reduced production of the $\beta^A$-globin chain.