Zinc Protoporphyrin (ZPP) Status in Thai β-Thalassemia and Hb H Disease

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ABSTRACT

Zinc protoporphyrin (ZPP) is a compound formed by the coupling of zinc and protoporphyrin IX in the state when the body cannot utilize iron for heme formation. Thus, the raised levels of ZPP is the indicator of iron-deficient erythropoiesis. The objectives of this study were to determine the levels of ZPP in thalassemic patients with the long-term goal in the evaluation of iron-deficient erythropoiesis in these patients. In addtion, the study was also aimed to assess the potential of ZPP as a marker for iron-overloading status, commonly observed in thalassemic patients. The study was conducted in 29 homozygous β-thalassemia, 34 hemoglobin E/β-thalassemia, 8 Hb H disease as well as 26 normal individuals. The ZPP was determined by the Hematofluorometric technique, iron parameters (SI, TIBC and TS) by the standard colorimetric method and red blood cell parameters by an automated blood cell analyzer. It was demonstrated that iron-overloading state occurred in thalassemic patients. The ZPP levels were significantly higher in thalassemic patients than in normal individuals. The highest levels of ZPP were seen in the HbE/β-thalassemia. Direct relationships were found between the ZPP levels and Hb, Hct, MCV, MCH and MCHC. However, inverse correlations were observed between ZPP levels and RDW and HbF levels. Finally, no correlatons were revealed between ZPP levels and iron parameters, including SI, TIBC and TS. It was concluded that iron-deficient erythropoiesis is present in homozygous β-thalassemia, HbE/β-thalassmia and Hb H disease. The ZPP levels could not be used to predict the severity of iron-overloading status, but instead, was promisingly applicable in assessing the iron-deficient erythropoiesis in these three types of thalassemia.

Key words: Zinc protoporphyrin (ZPP), Iron-deficient erythropoiesis, Iron overload, Thalassemia, β-thalassemia, HbE/β-thalassemia, Hb H disease

INTRODUCTION

Hemoglobin, the major intraerythrocytic oxygen-carrying protein, is a compound consisting of heme and glogin chains. Globin chains are the products of globin mRNA