Serum soluble transferrin receptor concentration as a biomarker of erythropoietic activity: surrogate marker of adequate transfusion in adult Beta-thalassaemia

ABSTRACT

Management of Beta (β)-thalassaemia intermedia in contrast to β-thalassaemia major patients has no clear guidelines as to indicators of adequate transfusion. Regular blood transfusion suppresses bone marrow erythropoietic activity. Serum soluble transferrin receptor (sTfR) concentration is a marker for erythropoietic activity, with increased sTfR being associated with functional iron deficiency and increased erythropoietic activity. This study aimed to determine the use of sTfR as an indicator of adequate transfusion in adult β-thalassaemia intermedia patients. A cross-sectional study was conducted at Hospital Ampang, Malaysia, for six months. Patient group included six β-thalassaemia intermedia and 34 HbE-β-thalassaemia transfused patients. None of the patients were on regular monthly blood transfusions as in β-thalassaemia major. The control group comprised of 16 healthy subjects with normal haematological parameters. Haemoglobin (Hb) analysis, sTfR and ferritin assays were performed. Hb and HbA percentages (%) were found to be significantly lower in patients compared to the controls, while HbE%, HbF%, sTfR and ferritin were significantly higher in patients. An inverse relationship was found in the controls between HbF% with Hb ($r = -0.515$, $p < 0.05$) and HbA% ($r = -0.534$, $p < 0.05$). In patients, sTfR showed an inverse relationship with HbA% ($r = -0.618$, $p = 0.000$) and a positive correlation with HbE% ($r = 0.418$, $p = 0.007$) and HbF% ($r = 0.469$, $p = 0.002$). Multivariate analysis showed that HbA% ($r = 2.875$, $p = 0.048$), HbE% ($r = 2.872$, $p = 0.020$) and HbF% ($r = 2.436$, $p = 0.013$) best predicted sTfR independently in patients. Thus, sTfR is a useful marker for erythropoiesis. The elevate sTfR in these patients indicate that the transfusion regimen used was inadequate to suppress ineffective erythropoiesis. Hb levels may not be the best target for monitoring transfusion treatment in β-thalassaemia intermedia patients, but the use of sTfR is helpful in individualising transfusion regimens.

Keyword: Serum soluble transferrin receptor; Serum ferritin; β-thalassaemia intermedia; HbE-â-thalassaemia; Ineffective erythropoiesis