Three Clinical Types of Sickle Cell-Beta-Thalassemia Disease in Bahrain: Dictating Role of Beta-Thalassemia Mutations

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ABSTRACT

Our objective in this report is to investigate beta-globin genotypes and the correlated phenotypes in sickle cell-beta-thalassemia (S-beta-thal) patients in Bahrain. A retrospective study and review of the EHR for patients with S-beta-thal uncovered during student screening project and premarital counseling that undergo full molecular analysis.Genetic Laboratory at Salmaniya Medical Complex. Full molecular analysis of the beta-globin gene was accomplished by using ViennaLab beta-thalassemia kit and RFLP analysis for the most common beta-thalassemia mutations in Bahrain. Hematology analyzer and HPLC instrument was used for blood phenotype analysis. Patients' clinical profiles obtained through the Electronic Health Record (I-Seha). We uncovered clinically three distinct forms of S-beta-thal with underlying five different beta-globin genotypes: first, a severe type of S-beta-thal [n=31] with underlying beta-thal mutations mainly of codon (Cd) 39 (HBB:c.118C>T) [n = 18; 58 %], or the IVS I,3'end (-25 bp deletion) (HBB: c.93-22_95del) [n = 13; 42 %], along with the sickle mutation in trans. Second, a moderate form of S-beta-thal [n=12] attributed to the coinheritance of nucleotide (nt) -88 (C>A) (HBB:c.-138C>A) [c.-138C>A] and the sickle cell mutation. Third, a milder form of s-beta-thal [n=24] with either nt -101 (C>T) [HBB: c.-151C>T] [n = 11] or nt -71 (C>T) [HBB: c.-121C>T] [n = 13], and the sickle cell mutation. The first type displays HbSS profile of Hb-electrophoresis with the absence of normal adult hemoglobin (HbA) and presence of various levels of HbS (Range: 57.6 % - 85.1 %) and elevated HbF (3.5% - 36.1%). The second type shows moderate Hb-electrophoresis profile with mean HbS of 61.7 ± 7.6 % and significant amount of HbA at 23 ± 6.1 %. The third type presents with distinct Hb-electrophoresis pattern resembling, in essence, Hb electrophoresis profile of sickle cell trait showing mean HbA of 45 ± 3.1 % and HbS of 41.6 ± 2.5 %. These findings would be invaluable for better understanding of the nature of S-beta-thal disease in Bahrain with implications for clinical follow up and premarital counselling for patients and their families.

Keywords: Bahrain; Sickle cell disease (SCD); sickle cell-beta-thalassemia (s-beta-thal); HbS-beta-thalassemia (HbS-beta-thal); beta-thalassemia.

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