

ABSTRAK

Latar Belakang: Pasien talasemia yang memerlukan transfusi darah berulang berisiko mengalami komplikasi seperti alloimunisasi, infeksi, dan reaksi transfusi. Reaksi transfusi hemolitik terjadi ketika antibodi resipien mengikat antigen pada sel darah merah donor. Di Indonesia, data mengenai genotip dan fenotip golongan darah serta kejadian transfusi berulang yang menyebabkan hemolisis pada pasien talasemia masih terbatas.

Tujuan: Penelitian ini bertujuan untuk menganalisis genotip golongan darah sistem ABO, Rhesus, dan Kell sebagai prediktor kejadian hemolisis pada pasien talasemia dengan transfusi berulang.

Metode: Penelitian observasional dengan pendekatan cross-sectional ini melibatkan pasien talasemia di RSUD Banyumas yang menjalani transfusi berulang. Sampel darah diperiksa menggunakan PCR ASP untuk genotip dan imunoserologi untuk fenotip. Pemeriksaan lanjutan dilakukan dengan sekuensing gen untuk mengetahui susunan genetik golongan darah. Petanda hemolisis (haptoglobin, LDH, bilirubin, hemoglobin bebas, hemoglobin urin) diperiksa menggunakan alat Cobas C113 dan ELISA.

Hasil: Hemolisis terjadi pada 66 pasien dan berhubungan dengan usia awal transfusi $\leq 1,5$ tahun, usia saat ini ≤ 12 tahun, frekuensi transfusi ≤ 3 minggu dan genotip DCCee memiliki risiko hemolisis yang lebih rendah dibandingkan varian rhesuslain. Alloimunisasi didapatkan 3,1% dengan antibodi E teridentifikasi.

Kesimpulan: Pemeriksaan genotip dan fenotip golongan darah Rhesus perlu dioptimalkan pada pasien talasemia dengan transfusi berulang untuk menurunkan risiko hemolisis. Pemeriksaan petanda hemolisis untuk subjek dengan inisiasi transfusi awal, frekuensi transfusi tinggi dan monitoring target Hb post transfusi perlu dilakukan untuk mengurangi kejadian hemolisis dan meningkatkan keamanan pengobatan

Kata Kunci: alloimunisasi, fenotip, genotip, hemolisis, talasemia

ABSTRACT

Background: Thalassaemia patients requiring repeated blood transfusions are at risk of complications such as alloimmunization, infection, and transfusion reactions. Hemolytic transfusion reactions occur when recipient antibodies bind to antigens on donor red blood cells. In Indonesia, data on blood group genotypes and phenotypes and the incidence of repeated transfusions leading to hemolysis in thalassaemia patients remain limited.

Objective: This study aimed to analyze ABO, Rhesus, and Kell blood group genotypes as predictors of hemolysis in thalassaemia patients who undergo repeated transfusions.

Methods: This observational, cross-sectional study involved thalassaemia patients at Banyumas Regional Hospital who received repeated transfusions. Blood samples were tested using PCR-ASP for genotyping and immunoserological methods for phenotyping. Further examinations were conducted by gene sequencing to determine the genetic configuration of blood groups. Hemolysis markers (haptoglobin, LDH, bilirubin, free hemoglobin, hemoglobinuria) were assessed using a Cobas C113 device and ELISA.

Results: Hemolysis was found in 66 patients and was associated with an initial transfusion age of ≤ 1.5 years, current age of ≤ 12 years, a transfusion frequency of ≤ 3 weeks, and a DCCee genotype, which had a lower risk of hemolysis compared to other Rhesus variants. Alloimmunization was detected in 3.1% of patients, with anti-E antibodies identified.

Conclusion: Rhesus blood group genotyping and phenotyping need to be optimized in thalassaemia patients who receive repeated transfusions to reduce the risk of hemolysis. Hemolysis markers should be examined in subjects who begin transfusions at an early age, have a high transfusion frequency, and require monitoring of post-transfusion hemoglobin targets to reduce hemolysis incidence and enhance treatment safety.

Keywords: alloimmunization, phenotype, genotype, hemolysis, thalassaemia