

ABO and Rhesus D Blood Groups in Patients with Chronic Heart Failure: Prevalence and Impact on Clinical Outcome

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Background:

Blood group systems based on red blood cell antigens are genetically determined and may identify individuals at risk. Type non-O of the ABO blood group system has recently been associated with coronary artery disease, thrombosis and a worse prognosis. We examined the distribution of blood group types in patients with heart failure (HF) and the impact on clinical outcome.

Methods:

We evaluated the ABO and Rhesus D antigen (Rh) blood types in a large cohort of chronic HF patients (N=3,815).

Results:

ABO blood type distribution in the HF population was not significantly different to that reported in the general Israeli population (A 40%, B 20%, AB 8%, O 33%). The percent of Rh-positive per blood type was also similar (A 11%, B 10%, AB 11%, O 8%). Patients with type O were more likely to be hypertensive compared to non-O type (Hypertension diagnosis: 85% vs 81%, $P<0.01$; Diastolic blood pressure: 71 ± 11 vs 70 ± 11 mmHg, $P<0.01$; Thiazide treatment: 25% vs 22%, $P<0.05$). Rh-positive patients were more likely have diabetes (51% vs 45%, $P<0.05$). Mean follow-up was 576 days. Overall survival during follow-up was 83%. Cox regression analysis after adjustment for significant predictors including age, gender, IHD, hypertension, atrial fibrillation, BMI, pulse, serum hemoglobin, sodium, eGFR and urea levels demonstrated that Rh-negative was associated with a worse prognosis. This effect was evident only in patients with IHD (N=2881, 76%): HR 1.72, 95% CI 1.28-2.31, $P<0.001$, Figure A. Type non-O was weakly associated with a worse prognosis compared to type O, after adjustment for age and gender (HR 1.18, 95% CI 1.00-1.38, $P=0.04$, Figure B).

Conclusions:

Blood group type distribution in HF patients are similar to the general population. Rh-negative is associated with a worse prognosis in patients with IHD, identifying a genetic sub-population at higher risk. The explanation and implications of this association need further assessment.