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Rh Subgroups and Kell Antigens in Patients With Thalassemia and in Donors in Turkey

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Abstract: Alloimmunization can be a significant complication of transfusion therapy in patients with thalassemia and hemoglobinopathies. The aim of this study was to investigate Rh and Kell antigens in patients with thalassemia major and in donors in Turkey. A total of 3061 donors and 155 thalassemic patients from three different blood donation centers in Turkey were the subjects of this study. Antigens of Rh and Kell were determined using the Diamed Gel Test.

The results of Rh haplotype tests in the thalassemic patients were 40.0% R1, 35.8% r, 19.8% R2, 2.8% R0, 1.4% r'; and in the donors were 46.7% R1, 33.8% r, 16.1% R2, 2.6% R0, 0.5% r1, 0.13% Rz and 0.08% r". The results of phenotype testing in the patients were 37.4% R1r, 35.7% R1R2,

10.3% rr, 6.6% R2r, 5.7% R1R1, 2.8% R2R2, 2.8% R0R0 and 0.8% rr'. The phenotypes of the donors were 33% R1r, 30.5% R1R2, 21.8% R1R1, 11.6% rr, 10.4% R2r, 2.7% R0R0, 2.4% R2R2, 0.9% rr" and 0.03% RzRz.

Of the Rh haplotype R1 was the most common in both groups; constituting 46.7% and 40.0%. R1r was also the most common Rh phenotype in both groups; constituting 37.4% and 33%. The incidence of Kell antigens in the donors and patients was 5.42 and 3.77% respectively. There was no significant difference in the haplotypes and phenotypes of these thalassemic patients and donors in Turkey.

Key Words: Blood subgroups, thalassemia, donors.

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Introduction

Regular blood transfusion and chelation therapy have become the mainstay of conventional therapy for thalassemia. The prevention of the complications of anemia and ineffective erythropoiesis is the goal of regular transfusion (1). Alloimmunization can be a significant complication of transfusion therapy in patients with thalassemia and hemoglobinopathies. It is mainly related to Rh and Kell systems (2, 3, 4, 5, 6). The aim of this study was to investigate Rh and Kell antigens in patients with thalassemia and in donors in Turkey.

Material and Method

A total of 3061 donors and 155 patients with thalassemia major from three different blood donation centers in Turkey were the subjects of this study. Antigens of Rh and Kell were determined with the Diamed Gel Test (7, 8).

Results

The distribution of the blood groups of the patients with thalassemia major were 45.1% A+, 33.5% O+, 12.3% B+, 5.2% AB+, 4.5% O-, 3.9% A- and 1.9% B-. The results of Rh haplotype tests in the thalassemic patients were 40.0% R1, 35.8% r, 19.8% R2, 2.8% R0 and 1.4% r', and in the donors were 46.7% R1, 33.8% r, 16.1% R2, 2.6% R0, 0.5% r', 0.13% Rz and 0.08% r" (Table 1).

The results of phenotype testing in the patients were 37.4% R1r, 35.7% R1R2, 10.3% rr, 6.6% R2r, 5.7% R1R1, 2.8% R2R2, 2.8% R0R0 and 0.8% rr'. The phenotypes of the donors were 33% R1r, 30.5% R1R2, 21.8% R1R1, 11.6% rr, 10.4% R2r, 2.7% R0R0, 2.4% R2R2, 0.9% rr" and 0.03% RzRz (Table 2). The incidence of Kell antigens in the donors and patients was 5.42 and 3.77% respectively.

Table 1. Rh Haplotypes in Patients and Donors.

Rh Haplotype	Patients (%)	Donors (%)
R1	40.0	46.7
r	35.8	33.8
R2	19.8	16.1
RO	2.8	2.6
r'	1.4	0.5
Rz	–	0.13
r''	–	0.08

Table 2. Rh Phenotypes in Patients and Donors.

Rh Phenotype	CDE	Patients (%)	Donors (%)
R1r	CcDe	37.4	33.0
R1R2	CcDEe	35.7	30.5
R1R1	CDe	5.7	21.8
rr	ce	10.3	11.6
R2r	cDEe	6.6	10.4
ROR0	cDe	2.8	2.7
R2R2	cDE	2.8	2.4
RzRz	CDE	–	0.03
rr'	Cce	0.8	–
rr''	cEe	–	0.98

Discussion

A total of 288 469 healthy people have been screened in different blood donation centers in Turkey. The distribution of blood groups is: A: 44.6%, O: 32.2%, B: 15.4%, AB: 7.6%, Rh (–): 11.9% and Rh (+) 88.1% (9). The distribution of the ABO groups and Rh in patients with thalassemia major is: A: 49.0%, O: 38.0% B: 14.2%, AB: 5.2, Rh (–): 10.3% and Rh (+) 89.7% It has been shown that there is no difference between healthy people and thalassemic patients in the ABO and Rh groups in Turkey. The A group is the most common ABO group in Turkey and Europe but the O group is the most common among whites, blacks and Indians in the U.S.A. and also among Oriental peoples (3, 4).

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There was no significant difference in the haplotypes and phenotypes of Rh in the thalassemic patients and donors in Turkey. R1 was the most common Rh haplotype in both groups, constituting 46.7% and 40.0%. R1r was the most common Rh phenotype in the patients 37.4%, and donors, 33% (Tables 1 and 2). While R1 is the most common haplotype in Turkey, whites and Indians in the U.S.A. and especially Oriental peoples, Ro is predominant in blacks in the U.S.A. (3, 4).

Alloimmunization is mainly related to the Rhesus (34%) and Kell (29.8%) systems in thalassemic patients (5, 6). The rate of allo-immunization also changes according to the age of the patient undergoing transfusion; 20.9% for younger patients and 47.5% for the older group (5). The risk of allo-immunization increases with the amount of blood transfused (2). We found the rates of Kell antigen in donor and patients were 5.4% and 3.7% respectively. The incidence of allo-immunization in the patients could not be determined as not all of them were screened for antibodies.

The incidence of delayed hemolytic transfusion reaction (DHTR) due to alloimmunization varied from 1/524 to 1/341 patients in the different centers (3). In the present study, DHTR was identified in a patient with thalassemia major. He was admitted to hospital with symptoms of a hemolytic reaction one month after his last transfusion. Antiglobulin and antibody screening tests were positive, C and D antigens were determined.

In conclusion, sensitization to clinically important minor blood group antigens can be prevented through complete blood typing. All patients should be genotyped before the first blood transfusion. There was no significant difference in the haplotypes and phenotypes of thalassemic patients and donors in Turkey.

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