SHORT COMMUNICATION

Frequency of ABO/Rhesus Blood Groups in Patients with Diabetes Mellitus

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Abstract

The correlation between ABO/Rh blood groups and diabetes mellitus is still controversial. The aim of this study was to determine the relationship between ABO/Rhesus blood groups and diabetes in Turkish population. This cross-sectional study was conducted in Istanbul Medeniyet University Göztepe Education and Training Hospital's Diabetes Units. The study group was composed of 421 patients with type-1 diabetes, 484 patients with type-2 diabetes and 432 controls. Blood samples were collected and tested for ABO/Rhesus blood groups. Data was analyzed by SPSS version 17.0. A significant association was found between blood groups and diabetes mellitus. The frequency of AB blood group was significantly higher in type-1 diabetics; and A blood group was significantly higher in type-2 diabetics. Furthermore, Rh negativity were significantly more frequent in type-2 diabetics.

Key Words: *Diabetes mellitus. Type-2. Type-1. Insulin dependent diabetes mellitus. Non-insulin dependent diabetes mellitus. Blood groups. ABO blood groups. Rhesus blood groups.*

Over the past years, researchers have found out relationship between particular ABO blood groups and increased susceptibility to certain diseases. For instance, peptic ulcer disease is seen more frequently among people with O blood group, whereas stomach cancer is often seen in A blood group. Diabetes Mellitus (DM) is one of the diseases investigated for such interrelation.

DM is a metabolic disorder which is characterized by a defect in insulin secretion leading to disturbances of carbohydrate and fat metabolism and resulting in hyperglycemia. It is classified as insulin dependent DM (type 1 DM) and non-insulin dependent DM (type-2 DM). The relationship between DM and ABO/Rhesus blood groups is still controversial. The aim of this study was to determine the relationship between ABO/Rhesus blood groups and type-1 and type-2 DM.

This cross sectional study was conducted with 905 diabetic patients attending to Istanbul Medeniyet University Göztepe Education and Training Hospital's Diabetes Units. Four hundred and twenty-one of these were type-1, and 484 were type-2 DM. To determine the distribution of ABO/Rhesus blood groups in population, 432 healthy controls were randomly included into the study. DM was diagnosed according to American Diabetes Association Criteria. The participants were classified as diabetics, if their venous blood glucose values were ≥ 7.0 mmol/l (126 mg/dl) or if they were taking medication for diabetes at the time of enrollment. The control group consisted of people whose venous blood glucose levels were < 6.1 mmol/l (110 mg/dl) and who have not received any diabetic medication. The blood samples were taken by a venipuncture and collected in EDTA bottles. ABO blood group testing was done by slide agglutination.

The data was analyzed by SPSS version 17.0 and described as frequencies, means and standard deviations. The chi-square test was used for comparing the sets of data. P-values < 0.05 were considered statistically significant. This study was approved by Istanbul Medeniyet University Göztepe Training and Research Hospital Ethical Committee.

Four hundred and twenty-one type-1 diabetics, 484 type-2 diabetics, and 432 controls were included in the study. Six hundred and ninety-seven (52.1%) participants were female and age ranged between 17 - 86 (mean = 42.6 ±13.4) years. The A blood group was the most frequent allele in the three groups (41.6%, type-1 DM; 57.6%, type-2 DM; and 41.7%; controls). It was followed by O blood group (34.2%, type-1 DM; 22.5%, type-2 DM; and 38.2%; controls), B blood group (15.4%, type-1 DM; 15.4%, type-2 DM; and 16.0%, controls) and AB blood group (8.8%; type-1 DM; 5.6%, type-2 DM, and 4.2%; controls), respectively. The distribution of ABO blood groups with regard to gender in diabetic patients and controls are shown in Table I. The A blood group was

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Table I: The distribution of ABO blood groups in diabetics and controls in terms of gender.

	Type-1 DM (n=421)		Type-2 DM (n=484)		Controls (n=432)	
	Female (n=196)	Male (n=225)	Female (n=230)	Male (n=254)	Female (n=271)	Male (n=161)
A	87 (44.3%)	88 (39.1%)	148 (64.3%)	131 (51.6%)	99 (36.5%)	81 (50.3%)
B	27 (13.7%)	38 (16.9%)	23 (10.0%)	46 (18.1%)	52 (19.2%)	17 (10.6%)
AB	22 (11.3%)	15 (6.7%)	12 (5.3%)	15 (5.9%)	11 (4.1%)	7 (4.3%)
O	60 (30.7%)	84 (37.3%)	47 (20.4%)	62 (24.4%)	109 (40.2%)	56 (34.8%)
Rh (+)	174 (88.8%)	196 (87.1%)	195 (84.8%)	224 (88.2%)	251 (92.6%)	148 (91.9%)
Rh (-)	22 (11.2%)	29 (12.9%)	35 (15.2%)	30 (11.8%)	20 (7.4%)	13 (8.1%)

Table II: Rhesus (Rh) group of diabetics and controls.

	Type 1 DM (n=421)	Type 2 DM (n=484)	Controls (n=432)
Rh (+)	370 (87.9%)	419 (86.6%)	399 (92.4%)
Rh (-)	51 (12.1%)	65 (13.4%)	33 (7.6%)

dominant in type-1 and type-2 diabetics, in both gender. Among the control subjects, O blood group was more frequent in females and A group in males.

The AB blood group was significantly more frequent in type-1 DM patients than type-2 DM patients ($p < 0.001$; $X^2=26.088$) and controls ($p=0.045$; $X^2=8.040$). Moreover, A blood group was significantly more frequent in type-2 patients than type-1 patients with DM ($p < 0.001$; $X^2=26.088$) and controls ($p < 0.001$; $X^2=31.749$).

Sixty-five (13.4%) type-2 diabetics, 12.1% (n=51) of type-1 diabetics, and 7.6% (n=33) of control group were Rh negative. Rh negativity was significantly lower in control group than in type-2 diabetics and type-1 diabetics ($p=0.016$; $X^2=8.313$, Table II).

This study indicated that in both diabetic and non-diabetic subjects, A blood group was the most frequent genotype followed by O, B and AB. This is compatible with previous studies conducted in Turkey.[1]

This data showed that AB blood group type was significantly more frequent in type-1 DM than type-2 DM and controls. Moreover, A blood group was significantly frequent in type-2 DM patients than type-1 DM and controls. A study from Turkey indicated that AB blood group was significantly frequent in diabetics.[2] In another study, Okon *et al*. indicated that A blood group was significantly frequent in DM.[3] The results of these studies are compatible with our work. Jassim *et al*. found out that O blood group was significantly more frequent in diabetics.[4] The others showed that B blood group was more often in diabetics comparing with non-diabetics.[5] Authors from different countries found out diversified relationship between frequency of ABO blood groups and diabetes mellitus. It could be caused by the distribution of blood groups in the population of these countries. In addition, there are studies that showed no association between ABO blood groups and DM.[6]

Rh system plays a role in organization of membrane phospholipids and expression of various glycoproteins on cell membrane, so it can influence the transport of glucose. For this reason, it can affect the clinical expression of diabetes.[7] We pointed out that Rh negativity in diabetics is significantly more frequent than in controls. This result is consistent with previous studies in Turkey.[2] However, Kamil *et al*. did not find any relation between Rh blood groups and DM.[6]

In conclusion, AB blood group is significantly more frequent in type-1 DM and A blood group is more frequent in type-2 DM. Also Rh negativity is significantly more often in diabetics than controls in our population. The mechanism with which ABO/Rhesus blood groups effect DM is poorly understood. Therefore, investigations are necessary to elucidate the relationship.

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