

ABO blood groups, Rhesus factor, and Behçet's disease

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Abstract

Introduction: Recently, numerous studies have been carried out to explain the genetics and immunopathogenesis of Behçet's disease (BD). There is still insufficient understanding of its etiopathogenesis, but substantial genetic and immune system abnormalities have been suggested. Several studies have shown remarkable associations of ABO blood groups with various diseases. This study investigated the relationship between ABO and Rhesus (D) blood groups and Behçet's disease in Turkish patients.

Methods: Clinical data on gender, ABO, and Rhesus blood type of patients with BD were collected at the Kayseri Education and Research Hospital from 2005 to 2012. A total of 115 patients with BD were assessed for their association with ABO or Rhesus (D) blood groups and compared with the distribution of the blood groups of 25,701 healthy donors admitted to the Kayseri Education and Research Hospital Blood Center in 2010 and 2011.

Results: The distribution of ABO and Rhesus blood groups in patients with BD was similar to the healthy donors. No relationship was found between ABO or Rhesus blood groups and BD at our hospital.

Conclusion: Further studies with a larger series and in different centers may be valuable for identifying the association between ABO or Rhesus (D) blood groups and BD.

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Introduction

Behçet's disease (BD) is a recurrent multisystem vasculitis characterized by oral ulcers, mucocutaneous disorders, and ocular findings. BD may be life-threatening, affecting the central nervous system, large vessels, or gastrointestinal tract (1, 2). Over the past decades, many studies have investigated the etiopathogenesis of BD, but the exact etiology and mechanisms of pathogenesis have not been clarified yet (1). A strong association with human leukocyte antigens (HLA)-B51 and TNF- α , IL-10, and IL-23R gene polymorphisms has been indicated in BD. However, the genetic mechanisms have not been explained for all patients (1, 3–5).

Like the HLA systems, blood groups, red cell isoenzymes, hemoglobin variants, and serum proteins are the genetic markers in human blood used for identifying human genetic variation. The frequencies of these polymorphic systems represent the genetic structure of a population (6). Antigens of the ABO blood group family have been known for a long time. The genes that determine the A and B phenotypes are found on chromosome 9p and are expressed in a Mendelian codominant manner (7, 8). The distribution of ABO and Rh blood groups may vary among nations and races. ABO blood group is a useful and valuable source because inheritance of blood groups is not affected by any environmental factors (6). Many studies observing the relationship of blood groups with cancers and other human diseases have been performed since the association between blood group A and gastric cancer was reported in 1953 (9–12). Case trials have demonstrated the significant associations of particular HLA antigens and also ABO blood groups with various autoimmune diseases such as juvenile diabetes, multiple sclerosis, rheumatoid arthritis, psoriasis and celiac disease (13–14).

To the best of our knowledge, this is the first study in the Central Anatolia Region of Turkey and the second in Turkey comparing the distribution of blood groups of patients with BD.

Methods

Education and Research Hospital. Cases with a serologically determined blood group and Rh factor were included in the study. Patients were classified according to blood groups (A, B, AB, O) and Rh status (+, –). The distributions of the BD patients' blood groups were compared with the distribution of blood groups of healthy donors that were admitted to the Kayseri Education and Research Hospital Blood Center in 2010 and 2011.

Statistical analysis was performed using SPSS 15.0 software (SPSSFW; SPSS Inc., Chicago, IL, USA). A chi-square test was used for investigating the correlation between categorical variables. Qualitative variables are given as percentages and a value of $p < 0.05$ was considered significant.

Results

The percentages of BD patients with O Rh(–) and Rh(+) blood groups were 7.8% and 32.2%, those with A Rh(–) and Rh(+) were 7.0% and 31.3%, those with AB Rh(–) and Rh(+) were 0% and 4.3%, and those with B Rh(–) and Rh(+) were 1.7% and 15.7%. Table 1 shows a comparison of ABO blood groups and Rh factor between patients with BD and the control group. There was no significant difference between patients with BD and the control group in terms of the distribution of ABO blood groups and Rh factor ($p = 0.143$).

The percentages of BD patients with blood groups O, A, AB, and B were 40.0%, 38.3%, 4.3%, and 17.4%, whereas those of the control group were 31.5%, 44.3%, 8.1%, and 16.1%, respectively. There was no significant difference between the BD group and control group in terms of distribution of ABO blood groups ($p = 0.125$).

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Table 1 | Comparison of ABO blood groups and Rh factor between Behçet's disease and control groups.

| ABO/Rh blood | Behçet's disease group (n/%) | Control group (n/%) |
|--------------|------------------------------|---------------------|
| O Rh (-) | 9 (7.8) | 990 (3.9) |
| O Rh (+) | 37 (32.2) | 7,096 (27.6) |
| A Rh (-) | 8 (7.0) | 1,299 (5.1) |
| A Rh (+) | 36 (31.3) | 10,087 (39.2) |
| AB Rh (-) | 0 (0.0) | 306 (1.2) |
| AB Rh (+) | 5 (4.3) | 1,784 (6.9) |
| B Rh (-) | 2 (1.7) | 506 (2.0) |
| B Rh (+) | 18 (15.7) | 3,633 (14.1) |
| Total | 115 (100.0) | 25,701 (100.0) |

Table 2 | Comparison of ABO blood groups between Behçet's disease and control groups.

| ABO blood | Behçet's disease group (n/%) | Control group (n/%) |
|-----------|------------------------------|---------------------|
| O | 46 (40.0) | 8,086 (31.5) |
| A | 44 (38.3) | 11,386 (44.3) |
| AB | 5 (4.3) | 2,090 (8.1) |
| B | 20 (17.4) | 4,139 (16.1) |
| Total | 115 (100.0) | 25,701 (100.0) |

Discussion

The genetic predisposition to BD is exhibited by an increased prevalence of BD all along the regions from Asia to the Mediterranean basin including Turkey, whereas the prevalence of BD is very low in North America and in western countries. (15). Several studies on the distribution of ABO gene frequencies in Turkey indicated that the gene frequencies of two systems (ABO and RhD) were found to be between those of Asians and Europeans (6). Investigation of the blood group distribution rates of patients with BD in a regional basis would obviously contribute to the knowledge of genetics in BD. In the pathogenesis of BD not only genetic

predisposition but also environmental factors are substantial. Inheritance of blood groups is not confounded by environmental factors and this provides a useful source of research for studies (7, 15). A previous study reported no difference in ABO and Rh groups in controls and patients with Behçet's disease from the eastern Marmara Region of Turkey (16). This is compatible with the results of our study, which was conducted in the Central Anatolia Region of Turkey. We did not find any other published study investigating the frequency of blood groups in BD in Turkey or elsewhere in the world.

The mechanism for the relation of ABO blood groups with some diseases has not been clarified yet. However, this association has shed some light on some aspects of the etiopathogenesis of those disorders (13). Recently, ABO blood group antigens have been found on most epithelial cells and in mucosa secretions. A/B antigens have been found in the oral epithelium of persons with blood groups A and B, respectively. The changes in expression of carbohydrate ABH antigens in epithelia has been found to be related to epithelial differentiation and cell maturation patterns; for example, the wound healing process and oral mucosa malignant disorders (17, 18). Various bacterial and viral agents in the oral mucosa are believed to be active in the pathogenesis of BD. A strong association of periodontal diseases with BD has also been demonstrated. Recurrent oral ulcers are the main finding associated with BD (15, 19). Thus, the relation of ABH antigens in oral ulcer patients with BD may be critical. Molecular studies may reveal changes in expression of ABH antigens in oral lesions of BD. As a result we did not find an association between ABO or Rhesus (D) blood groups and BD at our hospital, which is in a city in Turkey's Central Anatolia Region. However, further studies with larger series and in different centers, including molecular investigations, may be valuable for identifying the association between ABO or Rhesus (D) blood groups and BD.

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