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Research Article

Relation of Immune Thrombocytopenia and Blood Group: A Retrospective Single Center Study

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Abstract

Aim: Although blood group antigens were initially identified as erythrocyte surface antigens and their significance was mainly ascribed to serology, it soon became evident that these antigens are widely distributed in human tissues such as platelets. Immunthrombocytopenia (ITP) is a common autoimmune disorder characterized by a low platelet count. In our study, we investigated the relationship between ABO and Rhesus (Rh) blood groups and primary ITP.

Material and Methods: A retrospective study was conducted at our center with 304 patients diagnosed with primary ITP and 491 blood donors.

Results: ABO phenotype in patients group A, B, O, AB were 42.8%, 14.1%, 34.9%, 8.2%, respectively and 51.6%, 8.1%, 27.9%, 12.4% in the control group, respectively. Rh phenotype in patients group positive or negative 87.5%, 12.5 % respectively and 88.8%, 11.2% in the control group, respectively. A total of 304 patients with primary ITP, consisting of 203 (66.8%) females, and 101(33,2%) males were included in this study. The mean age was 49,5 ±18 years. There was no significant difference in the distribution of ABO blood types and Rh factor by gender (respectively p=0.176, p= 0.195).

Conclusion: In our study, no significant difference was found between the blood group distribution in the population and the blood group distribution of patients diagnosed with primary ITP.

Keywords: Blood groups, immunthrombocytopenia, thrombocytopenia, splenectomy

INTRODUCTION

Blood group antigens were initially discovered as erythrocyte surface antigens, and their importance was primarily assigned to serology. However, it quickly became apparent that these antigens are broadly distributed throughout human tissues, including the digestive and respiratory tracts. A, B, O, and Rh are the most prevalent blood groups out of the 330 near blood groupings. The ABO blood group system was first described by Karl Landsteiner in 1900. Despite their conventional association with red blood cells, the carbohydrate structures that make up the ABO blood group system (A, B, and H determinants) are expressed in a range of different cell types, including platelets and endothelial cells. It is well known that the ABO blood group is important for blood transfusion and transplantation (1). Surprisingly, significant links have been found between ABO blood groups and a variety of other diseases (2). Immunthrombocytopenia (ITP) is a common autoimmune disorder with a low platelet count. In primary ITP patients, autoantibodies have been found primarily to the platelet surface glycoproteins glycoprotein (gp) IIb - IIIa and gpIb – IX (3).

ABO antigens have been associated with various diseases. Platelets normally express small amounts of A and B antigens on their surface, which has been known for many years. First, it was discovered that approximately 5% of normal people with blood types A or B had platelets with an unusually high number of A and B antigen sites. In a study using flow cytometry to investigate the presence of blood group antigens on platelet surfaces, major and

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minor blood group antigens were found in low, moderate or high amounts on platelet surfaces. According to this study, blood group antigens were found in varying amounts on the platelet surface (4). Numerous investigations have discovered that in some circumstances, maternal IgG anti-B (and possibly anti-A) antibodies may result in newborn alloimmune thrombocytopenia. As a result, it appears that blood type and primary ITP may be related (5).

According to the study, gangliosides and LKEs have been found on the surfaces of erythrocytes and platelets. In paroxysmal nocturnal hemoglobinuria, gangliosides, which are frequent autoantigens for cold agglutinins in RBCs, may aid in complement-mediated hemolysis. These compounds may draw both alloantibodies and autoantibodies (6). Platelets may also experience cellular fragmentation similar to that seen in erythrocytes.

Hemostasis is significantly influenced by the ABO blood groups. They have a large quantitative effect on factor VIII and von Willebrand factor levels in plasma. Blood types A and AB are more likely to experience myocardial infarction, ischemic stroke, and venous thromboembolism, which may be because these conditions are modulated by functional ABO glycol transferases. Cerebral venous thrombosis is more likely to occur in non-O groups (4-6). Pre-eclampsia prevalence has been shown to be significantly correlated with ABO groups, and the AB group is linked to a 2.1-fold increased risk (7).

Studies are being done to determine how blood type and thrombocytopenia are related. To our knowledge, two investigations have looked into the connection between primary ITP and blood type. The goal of our study was to add to the body of knowledge by examining the association between primary ITP and the ABO and Rhesus blood groups (8,9).

MATERIAL AND METHOD

Our study included 304 patients (203 females) with primary ITP diagnosis and 491 (29 females) healthy blood donors as the control group. The mean age was 49.5 18 years. To determine ABO Rh blood group, the DiaClon ABO/D+Reverse Grouping (BIO-RAD) ID-card method was applied.

The association between the blood types of patients with primary ITP and those of blood donors without a diagnosis of any disease was evaluated using IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp. A mean, standard deviation, and percentage are used to represent the data. The chi-square test was employed to ascertain the association between category variables. A 0.05 p value was regarded as statistically significant. This study (date: December 12, 2019; No: 2019/1272) was authorized by the Adnan Menderes University School of Medicine's Ethics Committee for Non-Invasive Clinical Studies. Since this study was designed retrospectively, informed consent forms were not required.

RESULTS

The ABO phenotype in patients groups A, B, O, and AB were 42.8%, 14.1%, 34.9%, and 8.2%, respectively, compared to 51.6%, 8.1%, 27.9%, and 12.4% in the control group. Rh phenotype was positive or negative in 87.5%, 12.5% of patients and 88.8%, 11.2% of controls, respectively. This study included 304 ITP patients, of whom 203 (66.8%) were female and 101 (33.2%) were male. There was no statistically significant difference in the distribution of ABO blood types and Rh factor by gender (p=0.176, p=0.195, respectively) (Table 1). Splenectomy was performed on 79 patients (26.3%). There was no correlation discovered between blood type and splenectomy.

Table 1. The frequency distribution of ABO. Rh blood group among the ITP patients and controls

	ITP frequency (%)	Controls frequency (%)	Total frequency (%)	P
A	130 (42.8)	253 (51.6)	383 (49.1)	p>0.01
B	43 (14.1)	40 (8.1)	83 (10.4)	p>0.01
O	106 (34.9)	137 (27.9)	243 (30.6)	p>0.01
AB	25 (8.2)	61 (12.4)	86 (10.8)	p>0.01
Rh (+)	266 (87.5)	436 (88.8)	702 (88.3)	p>0.01
RH (-)	38 (12.5)	55 (11.2)	93 (11.7)	p>0.01
TOTAL	304	491	795	

*Chi-square test

DISCUSSION

In our study, there was no significant difference between the blood group distribution in the general population and the blood group distribution in patients with primary ITP. Although the B blood group was more common in ITP patients than in the control group, the difference was not statistically significant. Furthermore, there was no difference in the blood group distribution of patients diagnosed with primary ITP who underwent splenectomy for treatment. There haven't been many studies done on the relationship between primary ITP and blood type. Our study, which included a large number of patients and blood donors, was one of the first studies to investigate the relationship between primary ITP and blood group distribution.

Our study's primary flaw is that it was restricted to a specific

center and geographic area. Studies that are carried out in several centers can produce varying outcomes. Thus, understanding the connection between blood types and ITP may help us better treat ITP patients.

El-Khateeb et al. studied the relationship between blood types and ITP in 25 patients with primary ITP. In this study, there were 34 volunteers in the control group. ITP patients had a higher prevalence of blood group A (64%) than the general population (37.98%). The A phenotype blood group was found to be significantly higher in patients with primary ITP than in the control group. The findings of this study differed from those of ours. However, unlike our study, El-Khateeb et al. had a very small number of patients (8).

Sturgill et al. investigated the relationship between the response to IVIG treatment and blood groups in patients with primary ITP. Twenty-seven O blood type patients, nineteen A blood type patients, four B blood type patients, and two AB blood type patients participated in the study. RH was found to be negative in 12 patients. This study found no significant difference between response to IVIG treatment and blood group. In this study, only pediatric patients with ITP were included. The relationship between ITP and blood groups was not investigated in this study, but blood groups and response to IVIG treatment were. Unlike our study, this study did not compare the patients' blood group distribution to that of the control group (9).

In their study, E. Hussein et al. looked into the connection between TTP and blood types. In this study, the surveillance of 33 patients with severe ADAMTS-13 deficiency with blood group O and other blood groups were compared. It was hypothesized that the distribution of blood group O among TTP patients may be lower than expected due to low VWF levels. Contrary to predictions, the study's findings showed that the death rate for patients was 15.2% and was unaffected by blood type. Patients with idiopathic TTP had a lower (12%) than predicted (30%) distribution of group O. The outcomes could not have been as anticipated due to the study's limited sample size and lack of a control group (10).

Ozbay et al. investigated the relationship between epistaxis and blood type in the Turkish population. In this study, 359 patients who presented to the otolaryngology department from more than one centre and who did not have any other disease or drug use were included. The mean age of the epistaxis group was 43.37 and 23.61 years. Among the epistaxis patients, 43% were female and 57% were male. There were no differences that were statistically significant. While 43.5% of patients in the epistaxis group had O blood group, the rate in the control group was 33.9%. Patients with the O blood group in the epistaxis group were found to be significantly more than the control group (P 0.001). Unlike our study, bleeding was found more in patients with the O blood group in this study (11).

Tanrverdi O. investigated thrombocytopenia-inducedby chemotherapy in 131 stage 3 colon cancer patients, and chemotherapy-induced thrombocytopenia was found in 51 of these patients. When chemotherapy-induced thrombocytopenia patients were classified according to their blood groups, it was found that chemotherapy-induced thrombocytopenia was more common in patients with blood group O. The study discovered that blood group O was a distinct risk factor for chemotherapy-induced thrombocytopenia (P=0.035, OR 3.14, 95% CI 1.16-7.01). Unlike our study, this one lacked a control group, and the majority of the patients had the O blood group, which may have affected the findings (12).

Kumar S. et al. examined 81 patients with hematological malignancies who had been treated in a tertiary hospital for a year in terms of blood type and many other parameters. B blood group was found in 28.4% of acute hematological malignancies and 16.4% of chronic hematological malignancies. There was no statistically significant difference in blood groups between any malignancy and the control group, despite the greater rate of B blood group compared to the control group. Despite the fact that our study's results were similar, the small number of patients and the simultaneous evaluation of several characteristics can be viewed as potential factors that may have an impact on the study's conclusion (13).

Burd J. et al. conducted a retrospective study in which 32023 women who applied to the gynecology department over a seven-year period were evaluated in terms of postpartum hemorrhage and blood type. Even after adjusting for demographic differences (p=0.02), women who underwent cesarean delivery had a significantly greater rate of postpartum hemorrhage (5.2% type O vs 3.8% type A vs 4.4% type B vs 4.2% type AB, p=0.035). Between the vaginal and cesarean birth groups, there was no change in the rates of any of the secondary outcomes, including blood transfusion, hysterectomy, intrapartum dilatation and curettage, and critical care unit admission. The study's findings suggest that having a blood type of O may increase the risk of postpartum bleeding in women who have had cesarean deliveries. In contrast to our study, more bleeding was observed in patients with O blood type. However, because this study only included women, the results may have been different (14).

The prevalence of the O blood group in society is approximately 45%-49%, the prevalence of the A blood group is 27%-40%, the prevalence of the B blood group is 11%-20%, and the prevalence of the AB blood type is approximately 4% (15). Looking at the overall rate in Türkiye, the A, O, B, and AB blood group distributions are 42.84%, 32.67%, 16.46%, and 8.03%, respectively. The percentage of Rh positive people in Türkiye was determined to be 88.54% (16).

CONCLUSION

In conclusion, the findings of studies on bleeding and blood group or thrombocytopenia and blood group are contradictory. The blood groups of patients with primary

ITP in our study were similar to the blood group rates in the general population. Although there were 304 patients in our study, it is recommended to conduct studies involving more patients from different centers. Our research added to the body of knowledge about the relationship between ITP and blood types.

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