Turkish Journal of Life Sciences
Türk Yaşam Bilimleri Dergisi
http://dergipark.gov.tr/tjls

Turk J Life Sci
(2018)3/1:214-217
e-ISSN: 2536-4472

Received: 24.04.2018 | Accepted: 28.06.2018 | Research Article

Distribution of Blood Groups in Different Types of Leukemia Patients in Eskişehir, Turkey

Türkiye Eskişehir'deki Farklı Lösemi Hastalarında Kan Gruplarının Dağılımı

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This study has been presented as abstract in EurasianBioChem 2018
Handling Editor: M.Sevindik

Abstract

Biochemical and genetic studies by developing technology since the beginning of the 19th century have clarified the functional classification of human blood group antigens, the structures of A, B, H and Lewis determinants and the enzymes that produce them. Moreover, many studies have investigated whether blood group antigens are associated with disease risk. In this retrospective study, we aimed to determine the blood group distribution of patients who had different leukemia diagnoses. Patients were admitted to the Hematology Clinic of Eskişehir Osmangazi University between the years of 2010-2017. ABO and Rh(D) typing of 1055 patients were noted. There were 362 Acute Myeloid Leukemia (AML), 151 Acute Lymphoblastic Leukemia (ALL), 101 Chronic Lymphocytic Leukemia (CLL), 139 Lymphoid Leukemia) and 147 Chronic Myeloid Leukemia (CML) patients. When we examined the data, we showed the blood group distribution of leukemia patients as percentages A, 0 and B, respectively, but not statistically ($p>0.05$). At the same time, we found that the A Rh(D)+ blood group was more relevant when taken into account in the Rh(D) blood group. In this study, ABO and Rh (D) blood group distribution of different leukemia types (AML, ALL, CLL, CML) was shown for the first time in Eskişehir, Turkey. As a result, when we look at our data, different results are obtained in literature studies. However, we can't say which blood group is effective in different types of leukemia, so further research is needed.

Key words: ABO, Blood groups, Eskişehir, Leukemia, Rh (D), Turkey.

Öz

19. yüzyılın başından beri teknolojinin gelişmesiyle birlikte biyokimyasal ve genetik çalışmalar, insan kan grubu antijenlerinin fonksiyonel sınıflamasını, A, B, H ve Lewis belirleyicilerinin yapılarını ve bunları üreten enzimleri açıklığa kavuşturmuştur. Ayrıca, birçok çalışmada, kan grubu antijenlerinin hastalık riski ile ilişkili olup olmadığı araştırılmıştır. Bu retrospektif çalışmada, farklı lösemi tanısı olan hastaların kan grubu dağılımını belirlemeyi amaçladık. Çalışmaya, 2010-2017 yılları arasında Eskişehir Osmangazi Üniversitesi Hematoloji Kliniğine başvuran hastalar kabul edildi. 1055 hastanın ABO ve Rh (D) kan grupları belirlendi. 362 Akut Miyeloid Lösemi (AML), 151 Akut Lenfoblastik Lösemi (ALL), 101 Kronik Lenfositik Lösemi (KLL), 139 Lenfoid Lösemi) ve 147 Kronik Miyeloid Lösemi (KML) hastası vardı. Verileri incelediğimizde, lösemi hastalarının kan grubu dağılımını, sırasıyla A, 0 ve B yüzde olarak gösterildi fakat istatistiksel olarak anlamlı sonuçlar gözlenmedi ($p>0.05$). Aynı zamanda A Rh(D)+ kan grubunun Rh (D) kan grubu sınıflanmasıda dikkate alındığında daha anlamlı olduğu sonucuna varıldı. Bu çalışmada, ilk kez Eskişehir'de farklı lösemi tiplerinin (AML, ALL, CLL, CML) ABO ve Rh (D) kan grubu dağılımı gösterildi. Sonuç olarak, verilerimize baktığımızda literatürde yapılan çalışmalarda farklı sonuçlar elde edildi. Bununla birlikte farklı lösemi türlerinde hangi kan grubunun daha etkili olduğunu söyleyemeyiz, bu yüzden daha fazla araştırmaya ihtiyaç vardır.

Anahtar kelimeler: ABO, Kan grupları, Eskişehir, Lösemi, Rh (D), Türkiye.

1. Introduction

Karl Landsteiner first described ABO blood group antigens in 1901 (Acar 2001). Studies have shown that many membrane-associated structures in blood cells have antigenic properties that can result in antibody responses. Today, the number of blood group antigens serologically defined is more than 600. Most of these antigens are related to each other and form blood group systems (Bilgen 2005). Proteins, glycoproteins and glycolipids located on the surface of erythrocytes (Sloan et al. 2003) define blood group antigens. Thus, they are classified into different groups. Most blood group antigens are glycoproteins and are usually identified by oligosaccharide or amino acid sequence. When we review the catalog of the Intercolonial Blood Transfusion Society (ISBT) Working Committee, we see that 339 blood group antigens are listed; 297 of them were combined in 33 blood group systems (Story et al. 2012).

The antigens of the ABO blood group system are located on the extracellular surface of erythrocyte membranes, and these antigens are described as complex carbohydrate molecules (Storry and Olsson 2009). A and B antigens are linked to a carbohydrate chain on the membrane glycosphingolipids by terminal sugar. H antigen is a molecule found in most people's red blood cells. It is a constituent where both A and B antigens are formed. For the formation of antigen A, N-acetylgalactosamine must be added to the H antigen. It is known that antigen B is formed by the addition of galactose to the H antigen. In 0 blood group, H antigen is present but A and B antigens are absent (Sloan et al. 2003).

Besides the ABO blood group system, Rh blood group is present in the system and at least 45 independent antigens are formed. The Rh system is clinically important because of both the role of newborns in hemolytic diseases and transfusion mismatch (Schwarz and Dorner 2003).

The search for the distribution ratios of blood groups on a regional and national basis will contribute to science. In recent studies, the ABO and Rh distribution varied between different nations and regions. Both the ABO and Rh blood groups systems have been associated with a number of diseases. In some studies, the ABO blood group system has been shown to play a role in the development of cardiovascular, oncologic and other diseases (Franchini et al. 2012). Blood group antigens are known to participate in cell marking, cell recognition and cell adhesion due to their specific properties. Therefore, it is likely that they play a role in tumor formation, metastasis and prognosis (Weisbrod et al. 2013). Most of the studies on blood groups and cancer risks are made in the western world, and studies on other populations are limited.

Some studies also suggest that ABO blood groups can be used as an epidemiological marker or primary screening assistant to identify populations at high risk for certain hematological malignancies (Vadivelu et al. 2004). Therefore, the examination of ABO blood group distributions may be useful in formulating new etiological hypotheses. The etiology of leukemia (ALL, CLL, AML and CML) is still being discussed. Known risk factors (ionizing radiation and benzene exposure for leukemia, immunosuppression, and HIV infection) reveal only a small portion of the world's cases (Guillerman et al. 2011). We planned to study the distribution of ABO and Rh (D) blood groups among the types of leukemia in the Eskişehir region by considering that this might be useful for forming the database.

2. Materials and Methods

Data of leukemia patients who were diagnosed in Eskişehir Osmangazi University Hematology Clinic between 2010-2017 were retrospectively analysed. ABO and Rh(D) blood groups were classified according to different leukemia diagnoses. Statistical analysis was performed using Chi-square test. The Ethics Committee of Eskişehir Osmangazi University approved this study with decision number 80558721/G-350.

3. Results

In this study, blood group of 1055 patients diagnosed with leukemia were evaluated. The distribution of these diagnoses according to different blood groups is shown in Tab. 1. Among the diagnoses of leukemia, the most common was Acute Myeloid Leukemia (AML). AB0 and Rh (D) Blood groups of 362 AML patients were reached in 1055 participants. The ABO and Rh (D) blood group distribution were determined as 88 (24.7% 0 Rh(D)+), 142 (39.9% A Rh(D)+), 57 (16% B Rh(D)+), 29 (8.1% AB Rh(D)+), 4 (1.1% AB Rh(D)-), 19 (5.3% A Rh(D)-), 7 (2% B Rh(D)-) and 10 (2.8% 0 Rh(D)-) in AML patients. Acute Myelomonocytic Leukemia and Acute Promyelocytic Leukemia are within the AML diagnostic group. Distribution of A Rh(D)+ and 0 Rh(D)+ were found significantly higher when compared to other blood groups. The distribution of blood group in 151 ALL patients were found as 46 (30.5% 0 Rh(D)+), 54 (35.8% A Rh(D)+), 23 (15.2% B Rh(D)+), 15 (9.9% AB Rh(D)+), 0 (0% AB Rh(D)-), 4 (2.6 % A Rh(D)-), 1 (0.7 % B Rh(D)-) and 8 (2.8% 0 Rh(D)-). Analysis of ABO blood group in 101 CLL patients were determined as 30 (29.7% 0 Rh(D)+), 35 (34.7% A Rh(D)+), 16 (15.8% B Rh(D)+), 9 (8.9% AB Rh(D)+), 2 (2% AB Rh(D)-), 4 (4% A Rh(D)-), 3 (3 % B Rh(D)-) and 2 (2% 0 Rh(D)-). When we reached the results of 147 CML patients, the blood groups were 42 (28.6% 0 Rh(D)+), 65 (44.2% A Rh(D)+), 21 (14.3% B Rh(D)+), 5 (3.4% AB Rh(D)+), 1 (0.7% AB Rh(D)-), 8 (5.4 % A Rh(D)-), 1 (0.7 % B Rh(D)-) and 4 (2.7% 0 Rh (D)-). ABO and Rh (D) blood groups of patients with other leukemia diagnoses were shown in Tab. 1.

The ABO blood groups distribution of different leukemia patients is shown in fig. 1. When all the data were analyzed, we found that the distribution of A blood group was higher in ALL, AML, CLL and CML patients. Fig. 1 shows that the distribution of 0 and B blood groups after A blood group is high in different types of leukemia.

4. Discussion

This is a retrospective study aimed at showing the distribution of blood groups of leukemia patients admitted

Table 1: Distribution of ABO and Rh (D) Blood Groups in Different Leukemia Patients.

Diagnosis of Leukemia			Blood Groups								Total
			0 Rh(D)+	A Rh(D)+	B Rh(D)+	AB Rh(D)+	AB Rh(D)-	A Rh(D)-	B Rh(D)-	0 Rh(D)-	
AML	Acute Myeloid Leukemia	Count	88	142	57	29	4	19	7	10	356
		% within	24.70%	39.90%	16.00%	8.10%	1.10%	5.30%	2.00%	2.80%	100.00%
	Acute Myelomonocytic Leukemia	Count	0	1	0	0	0	0	0	0	1
		% within	0.00%	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
	Acute Promyelocytic Leukemia	Count	2	1	2	0	0	0	0	0	5
		% within	40.00%	20.00%	40.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Acute Lymphoblastic Leukemia (ALL)		Count	46	54	23	15	0	4	1	8	151
		% within	30.50%	35.80%	15.20%	9.90%	0.00%	2.60%	0.70%	5.30%	100.00%
Chronic Lymphocytic Leukemia (CLL)		Count	30	35	16	9	2	4	3	2	101
		% within	29.70%	34.70%	15.80%	8.90%	2.00%	4.00%	3.00%	2.00%	100.00%
Lymphoid Leukemia		Count	29	56	25	8	1	12	1	7	139
		% within	20.90%	40.30%	18.00%	5.80%	0.70%	8.60%	0.70%	5.00%	100.00%
Acute Leukemia, undefined cell type		Count	14	16	5	2	0	6	1	3	47
		% within	29.80%	34.00%	10.60%	4.30%	0.00%	12.80%	2.10%	6.40%	100.00%
Chronic Myeloid Leukemia (CML)		Count	42	65	21	5	1	8	1	4	147
		% within	28.60%	44.20%	14.30%	3.40%	0.70%	5.40%	0.70%	2.70%	100.00%
Chronic Leukemia, undefined cell type		Count	7	5	3	1	0	0	0	1	17
		% within	41.20%	29.40%	17.60%	5.90%	0.00%	0.00%	0.00%	5.90%	100.00%
Myeloid Leukaemia		Count	11	14	4	3	1	1	2	2	38
		% within	28.90%	36.80%	10.50%	7.90%	2.60%	2.60%	5.30%	5.30%	100.00%
Leukaemia, undefined		Count	8	7	3	1	0	1	0	1	21
		% within	38.10%	33.30%	14.30%	4.80%	0.00%	4.80%	0.00%	4.80%	100.00%
Leukaemia, undefined cell type		Count	3	4	1	0	0	1	0	1	10
		% within	30.00%	40.00%	10.00%	0.00%	0.00%	10.00%	0.00%	10.00%	100.00%
Leukemia, special cell type		Count	1	5	1	1	0	1	0	0	9
		% within	11.10%	55.60%	11.10%	11.10%	0.00%	11.10%	0.00%	0.00%	100.00%
Leukemia, other defined		Count	5	1	4	0	0	0	1	0	11
		% within	45.50%	9.10%	36.40%	0.00%	0.00%	0.00%	9.10%	0.00%	100.00%
Monocytic Leukemia		Count	0	1	1	0	0	0	0	0	2
		% within	0.00%	50.00%	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Total		Count	286	407	166	74	9	57	17	39	1055
		% within	26.60%	40.20%	17.40%	7.00%	0.50%	4.40%	1.60%	3.40%	100.00%

to the Hematology Clinic of Eskişehir Osmangazi University. ABO blood group is one of the hereditary features of people. ABO and Rh blood group systems have been shown to be involved in clinical trials (Yıldız 2016). Blood group antigens have been reported to play an important role in the development of certain diseases such as cancer, ulcers and allergies (Garraty 2005).

ABO and Rh blood group profiles among countries show great differences depending on ethnicity and race. For example, in India and the Lao population, blood group B is quite common, whereas O and A blood groups are more common in Europe, America and South East Asia (Alpdemir et al. 2014) The distribution of blood groups A, 0, B and AB in Turkey was determined as follows; 42.84%, 32.67%, 16.46% and 8.03 %. 88.54% of the population was found to be Rh (D)+ (Büyükyüksel 1973). In our study, the most common blood group type was A in leukemia patients and most of them were D+ as it is in general population.

At present, the relation between blood groups and certain diseases are still not fully understood. Therefore, we think that it is important to know the blood group distribution of a population in terms of community health. In some studies, the A blood group was found most frequently in larynx, pancreas, breast, testis and bone cancers. 0 blood group was seen in hypertension and migraine research.

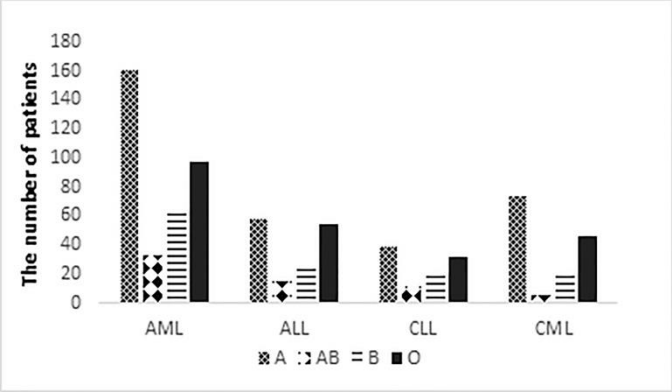

Figure 1. Distribution of ABO blood groups in different leukemia patients.

Periodontitis was observed in individuals with B blood group. In a cohort study by Huang et al. (2017), The AB and O blood groups were associated with a 24-28% risk of sarcoma, lymphoma, or leukemia, which was not statistically significant compared to the A blood group. In a study comparing leukemia patients to healthy controls, A, B or H antigen expression was reported to be significantly lower between 17 and 37% (Daniels 2013). In an older study, it was found that ABO blood group distribution did not show any significant difference between acute leukemia patients and healthy subjects (Shirley and Desai 1953). Nevertheless, it has been shown that there are different results in the studies carried out up to date. In a study by Alavi et al. (2006), they showed that the frequency of O blood group increased and the frequency of A and B blood groups are decreased in the ALL patients. At the same time, they found higher incidence of A blood group in AML patients. A research on leukemia patients in Turkey, reported no significant difference in the distribution of ABO blood group (Nevruz et al. 2005). A study in India, Vadivelu et al. (2004) showed an increased rate of O blood group in ALL patients. However, ABO blood group distribution in AML patients was not significantly different from the normal population.

Our study was conducted in all types of leukemia, unlike the studies described above. We found higher the distribution of A Rh D(+) blood group in ALL, AML, CLL and CML patients. Altough we have reached higher rate of ALL and AML patients than other leukemia types, we didn't find statistically significant results ($p>0.05$). In this study, we could not comment on the distribution of blood groups of these patients because the number of patients in some types of leukemia is low. However, we still showed the results in table 1 and figure 1. We found that the distribution of the A, B, 0 and Rh D(+) blood groups was higher in all types of leukemia. However, there was no statistically significant difference ($p>0.05$)

5. Conclusion

In the present study, the distribution of the ABO and Rh(D) blood groups of the different leukemia types was determined in Eskişehir, Turkey. Our findings show that there is a relationship between ABO and Rh (D) blood groups with different leukemia patients. According to our findings, we can't say whether blood groups can be used as an epidemiological marker for these malignancies. As a result, studies with blood groups should be continued to understand the etiology of hematological malignancies.

Conflicts of Interest: No conflict of interest was declared by the authors.

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