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Blood Group Analysis of Patients Applying to Erzurum Ataturk University Hospital

Abdullah Osman Kocak*, Mevlana Omeroglu, Burak Katipoglu, Ilker Akbas and Nazim Onur Can

Department of Emergency Medicine, Faculty of Medicine, University of Ataturk, Erzurum, Turkey

***Corresponding author:** Abdullah Osman Kocak, Assistant Professor, Department of Emergency Medicine, Faculty of Medicine, University of Ataturk, Erzurum, Turkey, Tel: (+90)-0442-344-8390; E-mail: abdullahmrym86@gmail.com

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Abstract

Introduction

The ABO and Rh blood group system is the most important system for transfusion and organ transplantation. The blood group system is used in genetic studies of the population other than blood transfusion, in cases of population migration-investigation of the pathways and controversial pregnancy.

Material and Methods

Our study was designed retrospectively. Patients who admitted to Ataturk University Research Hospital for diagnosis and treatment. İt is performed test of blood types in transfusion center between 01.01.2012 and 31.12.2015. These patients were included in the study.

Results

As a result of our study, the most frequent blood type was A Rh (+) with 27587 (39.59%) persons. The least common group was AB Rh(-) with 725 (1.04%) persons. 59936 (86.01%)of them were Rh (+) and 9750 (13.99%) were Rh (-).

Conclusion

Knowing the profile of blood types is a facilitating factor in the provider of blood and blood products. There is no other study about distribution of ABO and Rh blood groups in Erzurum region of Turkey in the literature. Investigation of distribution rates of blood types as national and regional can show the city or region where blood products are to be procured in disasters such as traffic accidents, war or earthquake. Also it would contribute medical science.

Keywords: Erzurum; ABO blood groups; Rh

Introduction

At present, 29 blood group systems, including Lutheran and MNS's ABO, Lewis, I, P, Rhesus, Kell, Duffy, and Kidd, have been reported in the literature. Of these, the most important blood group system from a clinical standpoint is the ABO system, first described by Landsteiner in 1900 [1]. Landsteiner reported the process of agglutination between antigens in erythrocytes and antibodies in serum and used the agglutination patterns to divide blood samples into groups according to the antigens carried by the erythrocytes. Thus, blood with A-antigen-carrying erythrocytes was named blood group A, and blood with B-antigen-carrying erythrocytes was named blood group B. He further identified blood with erythrocytes that carried neither the A nor the B antigens and named this blood group O, for the German word "ohne." One year after his initial study, he demonstrated another group that carried both the A and the B antigens, which he called blood group AB. In 1910, genetic inheritance of the ABO blood groups was confirmed, with A and B types showing dominance [2]. A further study in 1937 by Landsteiner and Wiener, using rabbit serum immunized with erythrocytes of the rhesus macaque monkey, revealed an Rh factor that agglutinated the erythrocytes of 85% of Caucasians [3].

The ABO and Rh blood group system is the most important system for transfusion and organ transplantation. This blood group system is also used in population genetics studies, in investigations of population migrations pathways, and in cases of controversial pregnancy [4]. In the present study, the blood groups of patients presenting at Erzurum Atatürk University Hospital were subjected to a frequency analysis to determine the distribution of ABO and Rh blood groups in this population from the eastern region of Turkey.

Material and Methods

Study design and setting

This retrospective study included patients who were admitted to Ataturk University Research Hospital for diagnosis and treatment [5]

and who underwent blood typing in the transfusion center between 01.01.2012 and 31.12.2015.

Selection of participants

We retrieved 92281 patient registrations from the hospital automation system for the selected date range. Of these, 22595 patients had no blood type data recorded in the automation system, and those patients [6-10] were excluded from the study. The study continued with the remaining 69686 patients.

Method of Measurement

Hemagglutination (tube method) or a microplate method was used to determine the ABO and Rh blood groups of the patients (ScotLab® Avitype Murine Monoclonal IgM Blood Grouping Reagent [11-13]. Anti-A, Anti-B, Anti-A,B for Slide, Tube, and Microplate Tests). An Immucor Gamma (Galileo model) immunohematology analyzer was used in our study. Statistical analysis of the data was conducted using the SPSS 20.0 program software for Windows.

Findings

Blood group distributions in the Eastern Anatolia region of Turkey are shown in Tables 1-3. Erzurum is a central hospital in the eastern region of Turkey, and it provides health services to 12 surrounding cities [14,15]. The most common blood type was A Rh (+), with 27587 (39.59%) persons. The least frequently seen type was AB Rh (-), with 725 (1.04%) patients. In total, 59936 (86.01%) people were Rh (+) and 9750 (13.99%) people were Rh (-). The least frequently seen Rh (+) group was the AB type, with 4507 (6.47%) persons. The most common Rh (-) blood group [16-18] was the A type, with 4541 (6.51%) people.

	0 Rh (-)	0 Rh (+)	A Rh (-)	A Rh (+)	B Rh (-)	B Rh (+)	AB Rh (-)	AB Rh (+)	Toplam
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Man	1380	8753	1997	12853	620	4077	316	2189	32185
	-1.9 %	-12.5 %	-2.86 %	-18.4 %	-0.88 %	-5.86 %	-0.45 %	-3.15%	-46.1 %
Woman	1702	10193	2544	14734	782	4819	409	2318	37501
	-2.4 %	-14.6 %	-3.65 %	-21.1 %	-1.13 %	-6.91 %	-0.59 %	-3.32%	-53.8 %
Total	3082	18946	4541	27587	1402	8896	725	4507	69686
	-4.4 %	-27.1 %	-6.51 %	-39.5 %	-2.01 %	-12.7 %	-1.04 %	-6.47%	-100 %

Table 1: Blood group distribution according to sex in erzurum region.

	Rh (+)	Rh (-)
Man	27872 (%86.60)	4313 (%13.40)
Woman	32064 (%85.50)	5437 (%14.50)
Total	59936 (%86.01)	9750 (%13.99)

Table 2: Rh Distribution İn Erzurum Region.

	A	B	AB	0	TOPLAM
Man	14850	4697	2505	10133	32185
Woman	17278	5601	2727	11895	37501
Total	32128	10298	5232	22028	69686
	-46.11%	-14.77%	-7.50%	-31.62%	-100%

Table 3: ABO blood types distribution.

Discussion

The first ABO blood type survey of the Turkish population was conducted by Hirszfeld and Hirszfeld in 1918 on 500 Turks living in Macedonia [5,19-24]. Since then, blood group distributions have been reported in many regions of Turkey, as summarized in Table 4.

Region	A	B	AB	0	Rh (+)	Rh (-)
	(%)	(%)	(%)	(%)	(%)	(%)
Erzurum	46.11	14.77	7.5	31.62	86.01	13.99
(Our study)						
Macedonian Turks (5)	38.8	18.6	6.6	36.8	-	-
Denizli City(6)	42,6	16.8	7.5	33.3	89.9	10.1
Eskişehir City(7)	41,91	16.85	8.5	31.1	86.65	13.35
Diyarbakır City(8)	40.8	18.5	7	33.7	89.2	10.1
Gaziantep City(9)	40.01	18.1	6.09	35.09	90.83	9.17
Kayseri City(10)	44	16.2	6.5	33.3	88.2	11.8
Konya City(11)	45	15.6	7.1	32.2	-	-
Istanbul City(12)	44.8	15.9	8.1	30.8	87.2	12.8
Malatya City(13)	41.21	14.99	6.56	37.23	89.3	10.7
Şanlıurfa City(14)	36.4	21.3	7.7	34.7	90.8	9.2
Rize City(15)	44.07	9.26	2.6	44.07	83.7	16.3
Van City(16)	45.05	16.14	8.16	30.65	90.4	9.6
Balıkesir City(17)	42.7	18.2	8.4	30.7	89	11
Ankara City(18)	44.62	15.45	7.69	32.24	88.13	11.87
Yozgat City(19)	44.3	15.9	8.1	31.7	88	12
Cyprus (20)	44.22	13.8	9.53	32.45	-	-

Table 4: Blood Group Distribution According To Different Geographical Regions.

The A and AB blood type counts were higher in our study than in the earlier study conducted by Hirszfeld and Hirszfeld, whereas the B and O blood type counts were lower in our study than in the earlier study [5,25-28]. By contrast, the distributions of blood types studied in other regions of Turkey are comparable with our findings. One noteworthy observation is that the A blood group is observed more frequently in our region, as well as in other regions of Turkey [29,30].

The ABO and Rh blood group profiles vary among human populations depending on region and native race [21,31-33]. The distribution of blood types according to country and around the world is shown in Table 5.

	A	B	AB	0	RH+	RH-
	(%)	(%)	(%)	(%)	(%)	(%)
Germany (22)	41	11	5	41	85	15
Iranian (23)	33	23	9	35	-	-
Nigeria (24)	25.3	16.7	2.7	53.3	94	6
Japan (25)	37.6	23,2	8.8	30.3	-	-
Kenya (26)	26.2	22	4.4	47.48	80.3	19.7
India (27)	22.88	32.26	7.74	37.12	94.61	5.39
Syria (28)	46.25	13.13	3.12	37.5	69.5	30.5
Saudi (29)	26.7	19.09	4.21	50	91.81	8.19
Pakistan (30)	23	33	8	35	-	-
Grece (31)	39.97	16.85	7.6	35.8	-	-
Worldwide (32)	41	9	3	47	-	-

Table 5: Blood types distributions İn other countries and worldwide.

The O blood type occurs at a higher frequency in Africa than in our country. The A blood type occurs less frequently in the Arabian Peninsula and in South Asia than in our country. The B blood group is seen more frequently in South Asia than in Turkey. The ABO blood type distribution in neighboring countries is similar to that of Turkey.

No diseases are directly associated with ABO antigens, but persons with some blood types may show a tendency to develop some diseases. For example, stomach cancer is more common in individuals with the A blood type, while gastric and duodenal ulcers are more common in persons with the O blood type. The relationship between ABO type and disease predisposition remains controversial. However, a clear correlation exists between the ABO phenotype and factor VIII and vWF, which play a role in blood clotting. People with O blood type have about 25% less factor VIII and vWF in their plasma. Low levels of factor VIII and vWF are associated with excessive bleeding, whereas increased levels of these proteins are associated with increases in both arterial and venous thromboembolism. Indeed, all people except those with O type blood are at increased risk for both arterial and venous disease [2].

The occurrence of blood-type–related diseases may help physicians in their diagnoses, as screening tests for blood types could represent a cost-effective method for early diagnosis and treatment of some diseases. In our region, stomach cancer is seen more frequently than in other regions, and this may reflect the more common occurrence of the A blood group in our region. Awareness of blood type profiles in a region could also facilitate the supply of blood and blood products. This study is the first to examine the distribution of ABO and Rh blood types in the Erzurum region of Turkey.

Conclusions

Possession of the right information about the distribution of blood types in a region will help to meet the needs of individuals and transfusion centers, while also contributing to the medical science literature. Investigation of the distribution of blood types at national and regional levels would also identify the blood products required in a city or region following disasters, such as traffic accidents, wars, or earthquakes.

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