



RESEARCH ARTICLE

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Rates of Rh and ABO Blood Groups in Uşak Area: A Cross-Sectional Study

Arzu ETEM^{1, a}
Hatice BOZKURT YAVUZ^{2, b}

¹ Uskudar State Hospital,
Department of Medical
Biochemistry,
İstanbul, TÜRKİYE

² Uşak University,
Faculty of Medicine,
Department of Medical
Biochemistry,
Uşak, TÜRKİYE

^a ORCID: 0000-0002-5849-0642

^b ORCID: 0000-0003-0468-2486

Objective: This study aims to determine the ABO blood groups and Rhesus (Rh) distribution in Uşak region and to apply these data scientifically in daily practice and the management of the blood center when necessary.

Materials and Methods: A total of 23.209 blood type and Rh analysis in 2022 Uşak Training and Research Hospital Blood Transfusion Center were analyzed retrospectively. Approximately 2mL of the venous blood sample with EDTA from the samples taken into tubes, ABO and Rh determination were made by gel-centrifugation method with Across Auto System OCTO-M device and Across Gel Forward@Reverse ABO with Dvi-/Dvi+ cards.

Results: In order of frequency, our results are ARh (+) 37.65%, ORh (+) 27.88%, BRh (+) 15.87%, ABRh (+) 7.90%, ARh (-) 4.54%, ORh (-) 3.27%, BRh (-) 1.96% and ABRh (-) 0.89%. The most common blood group in our region was ARh (+), and the rarest blood group was determined as ABRh (-). When the percentage of Rh factor was calculated independently, it was found as 89.31% Rh(+) and 10.68% Rh(-).

Conclusion: We think that the results of our article, which was performed for the first time in the Uşak area, will contribute to our transfusion medicine and practical applications. Our results were similar to the blood group distribution in Türkiye.

Key Words: ABO blood-groups system, Rho(D) antigen, transfusion medicine

Uşak Yöresinde Rh ve ABO Kan Grupları Oranları: Kesitsel Araştırma

Amaç: Araştırmadaki amacımız, yöremizdeki Rh ve ABO kan grup oranlarını belirlemek ve ihtiyaç olduğunda sonuçları kan merkezi idaresinde ve gündelik rutinde bilime dayalı kullanabilmektir.

Gereç ve Yöntem: 2022 yılı Uşak Eğitim ve Araştırma Hastanesi Kan Transfüzyon Merkezi'ne 23.209 kan grubu ve Rh testi istemi geriye dönük olarak değerlendirildi. 2mL EDTA'lı tüplere alınan örneklerden venöz kan numunesi jel santrifüj metoduyla Across Auto System OCTO-M otoanalizöründe Across Gel Forward@Reverse ABO with Dvi-/Dvi+ kitleriyle ABO ve Rh tespit edilmiştir.

Bulgular: Analiz sonrası ARh(+) %37.65, BRh (+) %15.87, ABRh (+)%7.90, ORh(+) %27.88, ARh (-)%4.54, BRh(-)%1.96, ABRh (-)%0.89 ve ORh (-)%3.27 olarak hesaplandı. Bölgemizde sıklığı en yüksek kan grubu ARh (+), en az bulunan ise ABRh (-) olarak tespit edildi. Rh antijeninin yüzdesi ayrı değerlendirildiğinde %89.31 Rh(+) ve %10.68 Rh(-) olduğu tespit edildi.

Sonuç: Uşak ilinde ilk defa yapmış olduğumuz araştırmamızın çıktılarının kan merkezi ve rutin işleyişimize katkı vereceğini bekliyoruz. Bulgularımız Türkiye geneli kan grubu oranları ile yakın düzeylerde çıkmıştır.

Anahtar Kelimeler: ABO kan-grubu sistemi, Rho(D)antijeni, transfüzyon tıbbı

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Introduction

ABO blood group system was first revealed in the early 1900's and, our knowledge of it has dramatically expanded since then. This improvements have assisted to more riskless blood transfusion process. As well as, the ABO blood group system has also begin to use in forensic analysis, population studies by anthropologists, and paternity issues (1).

Blood donation is utmost in global health systems, with over one hundred million blood units donated annually. Blood transfusion is central for patients dealing with trauma, undergoing surgery, handling chronic illnesses, and fighting cancer. this basic process assists as alifeline, and saving lives (2).

Blood, whose source is human, is a biological tissue with a unique structure and is mostly liquid. Blood transfusion is a form of treatment frequently used in medicine. Due to the differences in the antigen and antibody types found in the structure of blood, blood transfusion is a tissue or even an organ transplant. Before making a medical decision regarding transfusion indication, great care must be taken to ensure a safe transfusion (3).

The main goal of Blood Centers is to obtain and ensure the continuity of safe blood and products, taking into account compatibility tests that will minimize major transfusion reactions and infectious agents that can be transmitted through blood (4).

Correspondence

Arzu ETEM
Uskudar State Hospital,
Department of Medical
Biochemistry,
İstanbul - TÜRKİYE

arzuetem@yahoo.com

The International Society of Blood Transfusion (ISBT), Red Cell Immunogenetics, and Blood Group Terminology Working Group (ISBT WP) officially registers all blood group patterns known today. Today, there are 43 known blood group models containing 349 erythrocyte antigens (September 2022). The 43 blood group systems are genetically determined by 48 genes (5).

ABO grouping test is the most important test performed before transfusion. ABO and RhD group determinations must be made before every transfusion, including antenatal erythrocyte samples. In addition, the results of ABO and RhD grouping tests should be compared with existing records (6).

Rates of Rhesus (Rh) and ABO blood group systems vary among races, regions and countries, and even among groups with different ethnic origins in the same region (7).

As far as we know, we have not come across any studies on the distribution of blood groups in the Uşak region. The purpose of conducting this research is to determine the existing Rh and ABO blood group rates in our region and to use these results, if necessary, in blood center management processes and daily routine, based on science.

Materials and Methods

Research and Publication Ethics: Ethical approval for the research was received from the Uşak University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee dated 21.09.2023 and numbered 169-169-02. This study was conducted by the principles outlined in the 2008 Declaration of

Helsinki, in which all reported research involving "Humans" was conducted.

A total of 23.209 Rh and ABO tests that came to the Ministry of Health Uşak Training and Research Hospital Blood Transfusion Center in 2022 were evaluated retrospectively. Results without test data, sample rejection for different reasons, and reverse inappropriate results were excluded from the study. In addition, only one result of people who performed more than one test was included in the study, and repeated tests were excluded from the study. As a result, the number of tests we had was 19.508. Rh and ABO were detected in the across auto system Octo-M autoanalyzer with the sample taken into 2mL tubes containing EDTA, using the gel centrifuge method.

Statistical Analysis: Data entered into Microsoft Excel spreadsheet, and analyzed. Each group and subgroup was calculated as a percentage. Blood group phenotypic frequencies obtained in our study were presented as percentages.

Results

The results of our study; ARh (+) 37.65% (7346 individuals), BRh(+) 15.87% (3097 individuals), ABRh(+) 7.90% (1542 individuals), ORh(+) 27.88% (5439 individuals), ARh(-) 4.54% (887 individuals), BRh(-) 1.96% (383 individuals), ABRh(-) 0.89% (175 individuals) and ORh(-) 3.27% (639 individuals) (Table 1, Figure 1). It was determined that the blood group with the highest frequency in our city was ARh(+), and the group with the lowest frequency was ABRh(-). When the rate of Rh antigen presence was evaluated separately, it was found to be 89.31% Rh(+) (17424 individuals) and 10.68% Rh(-) (2084 individuals) (Table 1, Figure 2).

Table 1. Number and percentages of ABO and Rh individuals.

	Number of People	%	Total numbers of People	Total %
A				
Rh (+)	7.346	37,65	8.233	42,19
Rh (-)	887	4,54		
B				
Rh (+)	3.097	15,87	3.480	17,83
Rh (-)	383	1,96		
AB				
Rh (+)	1.542	7,9	1.717	8,79
Rh (-)	175	0,89		
O				
Rh (+)	5.439	27,88	6.087	31,15
Rh (-)	639	3,27		
Rh				
(+)	17.424	89,31	19,508	100
(-)	2.084	10,68		

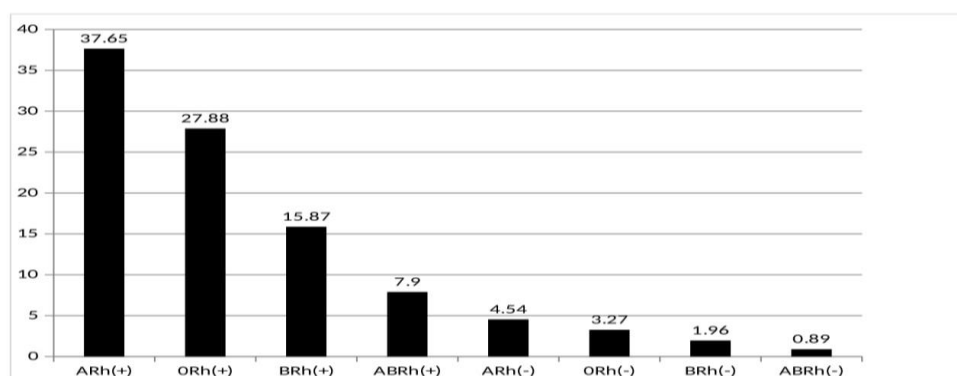


Figure 1. Distribution of the percentages of ABO and Rh groups

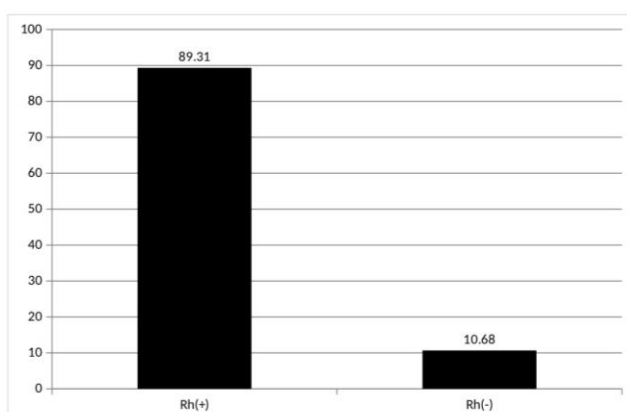


Figure 2. Distribution of Rh percentages

Discussion

Rh and ABO groups may vary depending on the region of residence and racial origin (5). When looking at the world, group O appears to be 47%, group A 41%, group B 9%, and group AB 3%, although different rates are reported depending on the region (6). Rh antigen is present in 85% of white people and is reported to be between 95-100% in black people (9). In our country, group A is 42.84%, group O is 32.67%, group B is 16.46%, the AB blood group is 8.03% and Rh antigen is 88.54%. Local averages that deviate from the known average in our country have been reported (10).

The ABO antigen model is formed by the polymorphism of complex carbohydrate molecules of glycolipids and glycoproteins existing on the membranes of red cells. The presence of the ABO gene on chromosome 9 is responsible for the inheritance of different blood subgroup types (11). Following the ABO blood group model, the Rh blood group model is the model containing the "Rh" factor, which causes the most severe immunogenic response. One of the most complex red cell antigen models is the Rh model (12).

When the levels in Istanbul are examined, in the article published by Gül in 2005; The percentages of A,

O, B, and AB were found to be 44.80%, 30.80%, 15.90%, and 8.10%, respectively (13). According to the article published by Salduz in 2015 in Istanbul, these percentages are; 43.44%, 33.02%, 15.00%, and 8.54% reported (8). When the data of these two articles and our study are compared, the A blood group percentages are very close to each other.

When we compare the results of the study published by Salduz et al. (8) in 2015 with the data of the article published by Gül (11) in 2005, in Salduz's report, group A is lower (43.44% compared to 44.80%) and group O is higher (30.80% compared to 33.02%) was found to be present. The change in blood group percentages in these two articles has been associated with the recent increase in immigration to Istanbul.

According to the data of the Turkish Statistical Institute, Uşak province received 13.705 immigrants in 2021. We could not make this comparison because we could not find any other research conducted in our city to compare our results. This can be considered a limitation for our study. However, the data we have reported will provide an opportunity for comparison in future studies on this subject.

There is a study in the literature conducted in Denizli province, which is adjacent to our city, in 2010, reporting Rh positive as 89.9% and Rh negative as 10.1%. In this study, the percentages of A, O, B, AB blood groups were found to be 42.6%, 33.3%, 16.8%, 7.4%, respectively. These rates in both the Rh system and the ABO system were very similar to the rates in our study (14). This shows that two neighboring provinces are similar in terms of blood group systems.

In the study conducted in Diyarbakır in 2008, blood groups A and AB were found to be slightly lower than our study, blood group O was found to be slightly higher, and blood group B was found to have very similar percentages to ours. It was thought that this difference was due to differences between regions (15).

The blood group distribution of donors who donated blood to the Kızılay in 2023 is seen as group A (42%), group B (16%), group AB (8%) and group O

(34%). If we compare our study with the Kızılay data showing the Turkish average, there is a very close percentage rate in terms of A, B and AB. Only in terms of group O, Uşak province is 3% lower (16).

In conclusion, we foresee that researching the distribution rates of blood groups at the regional and country levels will contribute to the fields of general medicine, anthropology, hematology, biochemistry, genetic, immunology and science, and when necessary, these data will be used in blood center management. We also think that it will be beneficial in terms of patient follow-up in daily practice.

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We anticipate that the findings of our research, conducted for the first time in Uşak province, will contribute to the transfusion center and routine operation, and will also serve as a database for our country and especially our region.

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