Alqalam Journal of Medical and Applied Sciences. 2025;8(2):562-564
https://doi.org/10.54361/ajmas.258204

Original article

Frequency and Distribution of ABO and Rhesus Blood Groups among Pregnant Women Attending the Obstetrics and Gynecology Department at Tobruk Medical Center

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Abstract
Blood transfusion procedures make the ABO and rhesus (Rh) blood group systems extremely important. The present study was to determine the prevalence of different blood groups and Rh factors in a random population sample among pregnant women attending the obstetrics and gynecology department at Tobruk Medical Center. Blood group and Rh factor determination was carried out by the antigen-antibody agglutination test tube from January 2022 to December 2022, and encompassed 3144 subjects. Data on the frequency of ABO and Rh(D) blood groups were reported in numbers and percentages. The percentages of various groups of subjects, respectively, were recorded as 38.3% for blood group O, 33.4 % for blood group A, 21.4% for blood group B, and 6.6% for blood group AB. The Rh-positive and negative distribution in the studied population was 86.7% and 13.3%, respectively. It is concluded that the O blood group was more prevalent, whereas AB was the least common. This study will support the development of a database for blood transfusion services. It would also reduce the risk of erythroblastosis foetalis in newborns.
Keywords. ABO Blood Group, Rhesus Blood Group, Blood Transfusion.

Introduction

Prior to the discovery of ABO blood groups, blood transfusions caused a high death rate because people were unaware of the variations in blood composition among the human population. Later research by Landsteiner allowed blood to be typed or grouped into ABO classes (A, B, and O) according to whether or not red blood cells (RBCs) have surface antigens [1]. DesCasterllo and Sturli discovered the final type (AB) in 1902[1]. These important findings result in a decrease in blood transfusion-related mortality. With three alleles (A, B, and O) and a phenotype that can be O, A, B, or AB, the human ABO type is a prime example of multi-allelism. The genes on chromosome 9(9q34) that encode glycosyl transferases, which transfer some oligosaccharide residues to the H antigen to form group A and B antigens, are always inherited and determine an individual's ABO blood type composition. However, O individuals do not exhibit this activity [2]. In terms of blood transfusion biology, the Rh blood type (Rhesus) is second only to the ABO blood group. The presence or lack of the Rh (D) antigen on the red blood cell is the most clinically significant polymorphism, even though it contains over forty-four distinct antigens [2].

Due to the distinct genetic makeup of each region's population, blood group frequency and distribution vary greatly across the globe. There are currently over 600 red blood cell surface antigens known to exist. Numerous of these antigens are in charge of determining a person's blood group system [3]. In addition to being expressed on red blood cells, ABO antigens are also highly expressed on the surface of a wide range of human cells and tissues, such as the vascular endothelium, sensory neurons, platelets, and the epithelium. As a result, the biological and clinical significance of the ABO blood group system goes beyond transfusion medicine and immunohematology, as there is mounting evidence that the ABO blood group is also a major factor in several human diseases, including diabetes, cardiovascular, neoplastic, and infectious diseases [4,5]. Based on the aforementioned, we can conclude that polymorphisms in the ABO and Rh blood groups are useful and essential tools in modern medicine, population genetics, and anthropology [5].

Numerous studies have examined the distribution of these two blood types in different populations worldwide, and their frequencies have shown significant regional variation, reflecting the underlying genetic and ethnic diversity of human populations. According to a multiracial/ethnic study conducted in the United States, blood type O is the most common (46 percent), with varying percentages of 45 point5, 56 point5, 50 point2, 39 point8, and 54 point6 among White non-Hispanic, Hispanic, Black non-Hispanic, Asian, and North American Indian people, respectively [15]. Different percentages of ABO and Rh blood types have been reported in other studies conducted in Turkey, Mauritania, Iran, Ethiopia, Colombia, Cameroun, Bangladesh, Madagascar, Morocco, Guinea, and Northern India. Nigeria is a nation with a large population that is made up of many ethnic groups [15.16]. Therefore, a thorough understanding of the distribution pattern of various blood types is essential for managing and preventing the deadly erythroblastosis fetalis by preserving blood bank supplies and lowering transfusion-related morbidity and mortality due to the paucity of information on the prevalence of various blood types in Tobruk city. Therefore, the distribution of the blood group system of Tobruk city was reviewed in this study to study the pattern of blood group systems

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Received: *03-02-2024* - ***Accepted***: *29-03-2025* - ***Published***: *05-04-2025*

distribution among pregnant women at the Gynecology and Obstetrics Department at the Tobruk Medical Center.

Methods

Using a retrospective study design, we included all pregnant women admitted between January 2021 and December 2021 in our cohort study. The hospital's laboratory information system and electronic records were used to extract the patients' medical records. A total of 3144 females were screened for blood grouping during a study on pregnancy-induced. Blood samples were taken by aseptic techniques, and blood transferred to ethylene diamine tetra acetate (EDTA) containing tubes. Blood typing was performed through the tube technique utilizing commercially available antiserums: anti-A, anti-B, and anti-AB for direct grouping, and reagent cells: A cells and B cells for indirect or reverse grouping (Fortress Diagnostics, UK). Agglutination in any tube or hemolysis signifies positive results. The presence of the D Rh antigen is ascertained by testing the red cells with reagent anti-D via the tube method. The data were examined to determine the frequency and distribution of the Rh and ABO blood groups.

Results

Out of a total of 3144 subjects, RhD positive blood groups were found in 2724 (86.7%), and 420 (13.3%) were found to be RhD negative. ABO blood grouping in the subjects is shown in Table 1. Blood group distribution in the total sample was 1207 (38.3%), 1052 (33.4%), 675 (21.4%), and 210 (6.6%) for blood groups O, A, B, and AB, respectively. The dominant blood group found in our study is blood group O, followed by A and B, while blood group AB was rare in these patients.

Table 1. Frequency distribution of ABO and Rh blood

Blood group	Total subjects Number (%)	RH+ Number %	RH- Number %
O	1207(38.3)	1038(38.1)	169(40.2)
A	1052(33.4)	911(33.4)	141(33.5)
B	675(21.4)	590(21.6)	85(20.2)
AB	210(6.6)	185(6.7)	25(5.9)
Total	3144	2724(86.7)	420(13.3)

Table 2. Prevalence of ABO and Rh blood groups in some different cities in Libya for comparison

City	RH+%	RH -%	O type %	A type %	B type %	AB type %
Bani Waleed City	72.2%	23.8%	43.6%	31.7%	17.7%	7%
Aljufra	85%	15%	46.2%	26.8%	21.6%	5.4%
Sebha city	81.7%	18.2%	42%	28%	23%	7%
Benghazi	85.8%	14.2%	40.8%	32.29%	16.59%	7.27%
Albiyda	83.92%	16.08%	37.44%	30.168%	23.43%	8.96%

Discussion

In this study, we were able to identified the prevalence of ABO and Rh blood types among admitted obstetric patients at TOBRUK medical center in Libya. The results of our study found that 86.7% of blood groups were RhD positive and 13.3% were RhD negative. Blood group O Rh positive female subjects were found to be dominant (28.06%) followed by A (25.5%), B (24.50%), and group AB (9.43%)

There are some studies from the different region in Libya describing the frequency and distribution of ABO, and Rh blood groups [15,17,19-21]. These studies' comparison with the data from our research reveals that there is an equal dominance of group O (Figure). These studies show similar results to our study. Other studies conducted in Jordan, Palestine, Syria, the United States, and Asia reported that the blood group O is dominant, with AB being the rarest. While other studies in Pakistan the prevalence of blood group B is higher as compared to studies conducted in Saudi Arabia and Egypt, where blood group A is more prevalent [22,23].

The result of our study matches with other studies done in different regions of Libya and the world. In addition, our study disagrees with results conducted in different regions of the world. The significant disparity in the distribution of blood groups could be attributed to geographical changes, external conditions, and genetic influences [8,10].

Conclusion

The present study concluded that the O blood group was more prevalent, whereas AB was least common, and in the Rh blood group system, the Rh-positive blood group was more common. The determination of the frequency of the ABO and Rh blood groups' antigens in the region are helpful in population hereditary studies, population movement designs, and resolving specific medico legal issues, especially in cases of disputed paternity. Blood group O positive was the most common blood group.

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Received: *03-02-2024* - ***Accepted***: *29-03-2025* - ***Published***: *05-04-2025*

Acknowledgment
We would like to thank the Medical Hospital of Sebha for their technical assistance.

Conflicts of Interest
There is no conflict of interest to report

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المستخلص
يعتبر نظام فصائل الدم ABO و RH الاكثر أهمية في عمليات نقل الدم وفقر الدم، وتعتبر معرفة نظام الفصائل مهم جدا في نقل الدم بسبب ارتفاع خطر حدوث رد فعل انحلالي حاد عند نقل الدم إذا تم نقل دم غير متوافق مع فصيلة الدم ABO وRH.أجريت الدراسة الحالية علي النساء الحوامل المترددات علي مركز طبرق الطبي في مدينة طبرق لتحديد توزيع وتكرار فصائل الدم ABOوالعامل الريسسRH .اشتملت الدراسة علي 3144 متردد داخل قسم النساء والولادة بمركز طبرق الطبي خلال فترة من يناير 2022الي ديسمبر 2022.تم استخدام طريقة الانبوبة لتحديد فصائل الدم والعامل الريسس. أظهرت نتائج الدراسة الحالية أن فصلية الدم Oهي اكثر فصائل الدم تكرار بنسبة 33.4% والعامل الريسس السلبي هو اقل تكرار بنسبة13.3%.نتائج هذه الدراسة سوف تدعم قاعدة البيانات التي تخص عمليات نقل الدم في المركز الطبية .

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Received*: 03-02-2024 -* ***Accepted****: 29-03-2025 -* ***Published****: 05-04-2025*