

DISTRIBUTION OF ABO AND RHESUS BLOOD GROUPS AMONG THE POPULATION IN YEFREN CITY, LIBYA

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مستخلص:

معرفة أنتشار مجاميع (فصائل) الدم ABO والعامل الرايزيسي Rh مهمة لأداره ناجحة لمصرف الدم وضرورية لخدمات نقل الدم بين السكان، تهدف الدراسة الحالية الى تحديد أنتشار فصائل الدم ABO والعامل الرايزيسي RH(D) في مدينة يفرن - ليبيا. أظهرت النتائج أنتشار مجاميع الدم ABO والعامل الرايزيسي (RH(D) كنسب مئوية ، فصيلة الدم O كانت الاعلى بنسبة 45.06% تليها فصيلة الدم A بنسبة 31.27%، وفصيلة الدم B بنسبة 18.62%، والاقل انتشار كانت الفصيلة AB بنسبة 5.05%، ايضا أظهرت النتائج ان العامل الرايزيسي Rh للحالات الموجبة بنسبة 80.46%، اما Rh للحالات السالبة بنسبة 19.54%. هذه الدراسة تقريبا أعطت معلومات عن انتشار فصائل الدم بين السكان في مدينة يفرن.

Abstract

The knowledge of the distribution of ABO and Rh blood groups is important for the blood bank's successful administration and necessary for the blood transfusion services among the population. The aim of this current study was to determine the distribution of blood groups of ABO and Rh in Yefren City, Libya. The distribution of ABO and Rhesus blood groups showed that the O group was found to be the highest with a percent (45.06%), followed by the A group (31.27%), B (18.62%), and the least distribution was the AB group (5.05%). Furthermore, our results presented Rh donors: Rh positive was 80.46%, and Rh negative was 19.54%. This study probably provided information about the distribution of blood groups through the population in Yefren.

Keywords: Blood groups, Blood donors, ABO, Rh, Yefren.

Introduction

The system of ABO blood groups, a discovery by Karl Landsteiner, unveiled three distinct blood types (A, B, and O) in 1900 [1,2]; then, forty years later, the Rh blood group system was discovered [3]. This system identifies four types (A, B, AB, and O). Additionally, the Rh system includes two Rh-positive and Rh-negative blood types [4]. Blood group ABO and the Rhesus system (Rh) are the most crucial list of other blood groups identified so far [5,6].

The ABO blood grouping classification relies on the existence or nonexistence of A and B blood group antigens situated on the surface of red blood cells (RBC), derived from inherited specific genetic material [2,4,7].

Understanding the distribution of ABO and Rh blood groups is important for effective blood bank inventory management, as it is necessary for the successful administration of blood transfusion services to reduce significant transfusion complications within any population [8,9,10,11].

Throughout the last four decades, many studies were conducted to ascertain the frequency of ABO and Rh blood groups together, diverging phenotypic results within varying populations in different areas of the world. To date, only a handful of the studies have explored the distribution of ABO blood group frequency in the population of the northwestern part of Libya.

The current research was carried out to determine the frequency and distribution of blood groups of ABO and Rh in Yefren City, Libya, as well as compare our findings with the outcomes of similar studies conducted both in Libya and globally.

Subjects and Method

The ABO blood group data was collected from the recorded data of the Medical Analysis Department of Yefren Central Hospital. Yefren is a small city 130 km to the southwest of Tripoli, Libya. Included in this study were 1407 subjects (male and female) with an age range of 18 to 65 years who were donors presented to the blood bank in Yefren City, and the period of the study spanned from January 2022 to December 2024.

The samples were obtained through venipuncture using a disposable syringe and immediately transferred to a tube containing ethylene diamine tetra acetic acid (EDTA), an anticoagulant. ABO and Rh-D grouping was carried out via agglutination tests employing commercially available antisera A, B, and Rh (D). Rh typing, only anti-D was utilized due to its high immunogenicity. Consequently, those who tested positive with anti-sera D were classified as Rh positive, while those who did not were considered Rh negative.

Statistical Analysis

The analysis of data was decided with the Microsoft Excel 2010 edition and GraphPad Prism version 5 software for all contributors of ABO blood group and Rh D blood types and converted into a percentage after being calculated by direct count. In addition, we compared our results with the outcomes of similar studies conducted both in different areas of Libya and in other countries of the world.

Results

The distribution of the ABO group in the present study, the O group, showed the highest prevalence by percentage (45.06%), followed by A (31.27%) and B (18.62%), respectively, and the least one was AB (5.05%) within the people population, Table 1. Also, the results showed the contribution of donors; Rh

positive was (80.46%), while Rh negative was only (19.54%), **Figure 1**. In addition, the results explained the distribution of ABO (Rh+) was O+ (36.03%), the highest; A+ (24.45%), B+ (15.85%), and AB+ (4.13%) were the least; and (Rh-) blood group was O- (9.03%), A- (6.82%), and B- (2.77%) successively, and the least ABO group was AB- (0.92%), as shown in **Figur**

Table-1: Distribution of ABO blood groups among our study

Blood group	Number (n)	Percentage (%)
A	440	31.27
B	262	18.62
AB	71	5.05
O	634	45.06
Total	1407	10.00

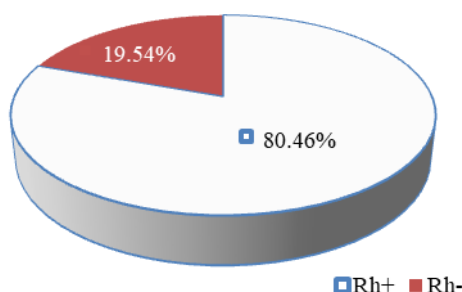


Figure 1: Distribution of Rh blood groups in this study

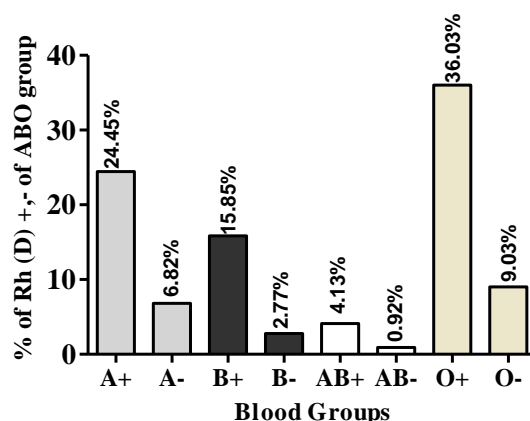


Figure 2: Distribution of ABO& Rh (D) phenotype among blood donors

Discussion

The current study, involving 1407 persons (male and female), in Yefren City, Libya, showed percentages of distribution of ABO blood groups were as follows: (45.06%), (31.27%), (18.62%), and (5.05%) for blood groups O, A, B, and AB, respectively. Previous studies in cities of Libya and other different countries of the world presented similar results as a percentage of blood group, which is the O blood group found to be more distributed, followed by A, B, and AB in order, Table 2 [13–16].

Table–2: Distribution of ABO and Rh (D) among blood donors of Cities of Libya.

Location	Blood group				Resus Factor		Reference
	A%	A%	AB%	O%	Rh+	Rh–	
Yefren	31.27	18.62	05.05	45.06	80.46	19.54	Current study
Sebratha	34.00	18.13	4.68	43.19	83.53	16.47	[12]
Albiyda	30.17	23.43	8.96	37.44	83.92	16.08	[13]
Azawya	34.60	15.80	4.40	45.00	89.40	10.60	[14]
Tarhuna	31.28	14.86	4.43	49.43	86.71	13.29	[15]
Almeregeb Provence	37.65	15.22	5.96	41.17	84.60	15.40	[16]
Aljufra	26.80	21.60	5.40	46.20	85.00	20.00	[17]
sebha	28.27	23.00	7.00	42.12	81.70	18.30	[18]

The most populated population of the world has more Rh+ than Rh–; thus, as our study displayed, Rh positive (80.46%) is higher than Rh negative (19.54%), which is accepted with other studies in Libya and other different countries of the world as explained in Table 2–3.

Table–3: Distribution of ABO and Rh (D) among blood donors of different countries of the world

Location	Blood group				Resus Factor		Reference
	A%	B%	AB%	O%	Rh+	Rh–	
Addis Ababa, Ethiopia	28.41	21.24	5.71	44.65	94.82	5.18	[19]
Algiers	30.84	16.63	10.60	41.93	93.49	6.51	[20]
Amman, Jordan	36.82	18.62	7.12	37.44	88.73	11.27	[21]
Colombia	51.18	8.66	3.14	37.00	91.33	8.66	[22]
Egypt	35.12	23.12	9.74	31.94	91.78	8.22	[23]
IBB Province, Yemen	34.41	8.43	1.71	55.45	80.00	20.00	[24]
Iran	28.48	24.71	6.60	40.21	92.38	7.62	[25]
Iraq	36.00	37.00	7.30	29.70	93.00	7.00	[26]
Morocco	32.86	15.80	4.53	46.80	91.00	9.00	[27]
Nigeria	22.77	20.64	3.66	52.93	94.90	5.10	[28]
NigistnHospital, Ethiopia	32.20	22.5	6.40	39.0	92.90	7.10	[29]
Northwest Nigeria	20.90	13.30	1.50	64.30	95.40	4.60	[30]
Saudi Arabia	23.40	26.40	5.70	44.50	88.20	11.80	[31]
South East Ethiopia	27.30	25.50	5.50	41.70	94.88	5.12	[32]
United Arab of Emirates	26.68	23.90	5.58	43.83	92.57	7.43	[33]

Conclusion

Through this study, we found the distribution of different ABO blood groups and Rh reuses in Yefren; the O group was the highest one, followed by A and B,

respectively, and the least one was the AB group. This knowledge, a distribution of ABO and Rh blood groups, is important for blood banks and necessary for the successful administration of blood transfusion services among the population in a definite geographic area such as Yefren City.

Acknowledgements

We would like to thank the technicians in the Medical Analysis Department of Yefren Central Hospital for their cooperation and help.

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