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ORIGINAL RESEARCH

ABO and rhesus blood group distribution in Kurds

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Background: It is well established that ABO and rhesus (Rh) genes and phenotypes vary widely between ethnic groups and both within and between geographical areas. The aim of this study was to determine the distribution of ABO and Rh blood groups in Kurds and to compare it with those of other populations.

Subjects and methods: The study included blood grouping of total population of 53,234 whose ABO and Rh blood groups were determined by standard methods during a period of about 5 years (2005–2009).

Results: The most prevalent blood group was O (37.16%), followed by blood groups A (32.47%) and B (23.84%), whereas the least prevalent blood group was AB (6.53%). The majority 91.73% were Rh positive, and 8.27% were Rh negative. Data showed that among the Rh-positive individuals, 34.03% were O, 29.99% were A, 21.69% were B, and 6.02% were AB. Break up of the Rh negatives showed that 3.13% were group O, 2.48% were A, 2.15% were B, and 0.51% were AB.

Conclusion: Blood group O is the commonest blood group in, followed by A, B, and AB. More than 91% of the study population is Rh positive. Also, we can conclude that distribution of ABO and Rh blood groups in Kurds, in addition to being close to the mean of the world's population, is closest to Iranians, with similar trend to the neighboring countries, and appears to be intermediate between eastern (Asian) and western European (Caucasian) data.

Keywords: ABO, rhesus, blood group, Kurds

Introduction

ABO blood group was discovered by Karl Landsteiner during early experiments with blood transfusion in 1901, for which he received the Nobel Prize 30 years later, and in cooperation with Alexander S Wiener, the rhesus (Rh) group was discovered in 1937.[1] Even after 100 years, the single most important test performed in blood banking services is determination of ABO blood groups to avoid morbidity and mortality.[2]

Blood classification into groups is based on the presence or absence of inherited antigenic substances on the surface of red blood cells (RBCs). Some of these antigens are also present on the surface of other types of cells and body secretions like saliva, sweat, semen, serum, tears, urine etc,[3] which are used in forensic investigations. Several of these RBC surface antigens that stem from one allele (or very closely linked genes) collectively form a blood group system. Blood groups are genetically determined and exhibit polymorphism in different populations. A total of 30 human blood group systems are now recognized by the International Society of Blood Transfusion.[4] Blood groups are inherited from both parents. The ABO blood types are controlled by a single

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gene located on the long arm of the ninth chromosome with 3 alleles: i, IA, and IB. IA and IB alleles are dominant over i, expressing a special dominance relationship (codominance), which means that type A and type B parents can have an AB-type child and O-type child if they are both heterozygous (IBi, IAi).[5] ABO blood groups are the most investigated blood group system, and owing to ease of identifying their phenotypes, they have been used as genetic markers of populations. It is well established that differences in ABO blood groups exist, both within and among ethnic groups and by geographical area.[6,7] Some variations may even occur in different areas within one small country.[8]

It is interesting to note that the distribution of ABO and Rh blood groups varies from race to race; therefore, the distribution of the blood groups A, B, O, and AB varies across the world according to the population and within human subpopulations, eg, in United Kingdom, the distribution of blood type frequencies in the population still shows some correlation to the distribution of placenames and to the successive invasions and migrations, including Vikings, Danes, Saxons, Celts, and Normans, who contributed the morphemes to the placenames and the genes to the population.[9]

Blood group distribution in different groups of population is important in health care and blood transfusion.[10] Clinically, the two most significant blood group systems are ABO and Rh. Knowing of phenotype distribution of ABO system in a given population is important for planning procurement of blood supplement and associated diseases with blood group[11] and to know if any significant phenotype dispersion is present when comparing with other population.

Almost always, an individual has the same blood group, but very rarely, an individual's blood type changes through addition or suppression of an antigen, eg, in malignancy[12] or in autoimmune diseases.[13]

When the rate of Rh positive is considered, varying percentages were reported in various races and populations: Caucasians (85%),[7] African blacks (94%),[14] Asians (99%),[7] Arabians (91%),[15] and Europeans with their descents (84%).[16]

To the best of our knowledge, there is no recent published study available on the distribution of ABO and Rh blood groups in Kurds (the native inhabitants of Mesopotamia). We designed this study to find out the frequency of ABO and Rh (D) phenotypes in Kurds of Iraq.

Subjects and methods

This study was carried out over a period of 5 years (2005–2009). The study population included a total of 53,234 apparently healthy subjects; 28,379 were men, and 24,855 were women. Their age ranged between 18 and 46 years (mean, 27.4 ± 6.2). The majority of study population were from attendants of Ma'moon Al-Dabbagh Health Centre laboratory for health screening and counseling before marriage and Hawler Teaching Hospital Laboratory for health screening and blood grouping, which is mandatory for various purposes, such as army recruitment, pre-employment health screening, and screening for driving license. This to a great extent excluded individuals with chronic illnesses, eg, diabetes mellitus, peptic ulcers, and malignancies.

All subjects were of known Kurdish ethnicity tribes from different provinces of Kurdistan Region of Iraq; Erbil, Duhok, Sulaymani, and Kirkuk, who were identified by their national Iraqi ID cards. The blood samples of the study population were typed by slide method, using ABO and Rh (D) Typing Antisera, Biotec Laboratories, United Kingdom. Manufacturer's procedural instructions were followed. Results were compared with similar group prevalence studies from neighboring countries and world ethnic groups and races.

Results

The prevalence of O, A, B, AB, and Rh phenotypes is shown in Table 1. The most common blood group was O (37.16%), followed by blood groups A (32.47%) and B (23.84%). Blood group AB occurred at lowest prevalence (6.53%). The prevalence of the ABO phenotypes linked with Rh phenotype was O+ (34.03%), followed by A+ (29.99%), B+ (21.69%), and AB+ (6.02%). The lowest prevalence was that of AB – (0.51%) (Table 2). The difference in the pattern of blood groups O, A, B, and AB in men and women was inconsequential.

Discussion

This study has determined the distribution of ABO and Rh (D) blood groups in Kurds at Kurdistan Region of Iraq in both sexes. Blood group of donors was not included to avoid

Table 1 Prevalence of the phenotype of ABO and Rh (D)

Phenotype	Men	%	Women	%	Total	%
(I) ABO phenotype						
A	8,946	31.52	8,337	33.54	17,283	32.47
B	6,793	23.94	5,900	23.74	12,693	23.84
AB	2,067	7.28	1,408	5.66	3,475	6.53
O	10,573	37.26	9,210	37.06	19,783	37.16
Total	28,379	100	24,855	100	53,234	100
(II) Rh (D) phenotype						
Rh (+ve)	26,170	92.22	22,663	91.18	48,833	91.73
Rh (–ve)	2,209	7.78	2,192	8.82	4,401	8.27
Total	28,379	53.31	24,855	46.69	53,234	100

Table 2 Prevalence of ABO and rhesus blood groups in Kurds

ABO blood group	Rh factor (D)	No	Prevalence	Total
A	Positive	15,965	29.99	32.47
A	Negative	1,318	2.48	
B	Positive	11,548	21.69	23.84
B	Negative	1,145	2.15	
AB	Positive	3,204	6.02	6.53
AB	Negative	271	0.51	
O	Positive	18,116	34.03	37.16
O	Negative	1,667	3.13	
Total	Positive	48,833	91.73	100
Total	Negative	4,401	8.27	

Table 3 Prevalence of ABO phenotype of Kurds compared with neighboring countries and some other populations

People group	O	A	B	AB
Iraq (non-Kurds)[6]	36	30	26	8
Saudi Arabia[24]	51	26	19	4
Kuwait[21]	44	27	24	5
Jordan[23]	37	38	18	7
Iran[20]	35	33	23	9
Syria[27]	38	46	13	3
Turkey[26]	32	46	15	7
Asians (eg, India)[25]	39	23	33	5
African blacks (eg, Nigeria)[14]	53	24	20	3
Caucasian[24]	47	41	9	3
Europeans[16]	43	40	12	5
World's population[28]	41	32	22	5
Kurds (this study)	37	32	24	7

a possible bias, as blood group O+ is regarded, in our country and some other countries, as a generous and more precious blood group encouraging more donation,[17] and differences in blood group prevalence between general population and blood donors are obvious in some other studies.[18] Also, the blood donation system in Iraq differs from many other countries in that the family and relatives of the recipient are responsible to insure blood units of the same recipients' blood group available for transfusion, with its consequences in amplification of the number of donations of high incidence blood groups like group O, A, and Rh positive and low incidence of donation of less frequent blood groups like B, AB, and Rh negative, which falsely decrease its incidence more.

There were no significant differences in both ABO and Rh blood groups in men and women. This is because blood groups are of autosomal inheritance, thus, the frequencies are not different in both sexes, and, therefore, in blood group studies from all populations, blood groups are reported for men and women together. The marked differences between this study and a previous study on Kurds in Baghdad[19] most probably can be attributed to a possible sampling error and the smaller size of the study population as Kurds are only forming about 5% of Baghdad population, whereas in Kurdistan region, Kurds are forming more than 95% of population.

Populations across the globe differ in the distribution of their blood group phenotypes (Table 3). In this study population, the frequency of blood group O was higher than A, followed by B, and the lowest was AB. These results were very close to a previous study on a smaller population of Iraqis (not Kurds).[6]

Also, more probably, our results were close to many studies in Iran[20] because both Iranians and Kurds (ie, ancient Medes) and Iraqis in general share the same history of the area. Results of this study have some similarity, but less close trends as seen in some of the neighboring Arab countries, eg, Kuwait,[21] Saudi Arabia,[22] and Jordan.[23] These trends were also observed in populations of other ethnicity like Caucasian,[24] Blacks,[14] and Europeans.[16] In many Asian populations, there is an increase in the prevalence of group B, eg, India and Malaysia.[25] Our results were not comparable to the situation seen in the neighboring Turkey[26] and Syria,[27] with higher prevalence of group A.

Rh (D) positive frequency (91.73%) in this study was similar to some neighboring Arabian countries, eg, Saudi Arabia (91.22%),[15] Arians (91.7%),[25] and Iran (88.7%).[20] Compared with racial groups, it is similar to African blacks (94%)[14] but with a marked differences from those of Caucasians (85%), including Europeans and their descents,[16] and Asians (99%).[7] This suggests that the expected frequency of Rh isoimmunization would be lower in Kurds and neighboring countries than that encountered in Europeans and white Americans. Results of these study samples (53,234) out of total population of Kurds in Iraq (5,500,000) have a similar trend to the means of the world's total studied population (2,261,025,244).[28] This study and the cumulative information from different literatures indicate a multiethnic origin of the population of a country and reflect the relics of the historical movements of different racial groups in a region and in the world during disasters and wars with the ultimate changes in the history of human civilization.

From this study, we can conclude that this is the largest and most reliable data of ABO and Rh (D) phenotype frequencies in Kurds. It is close to the mean of the world's population, with similar trending to Iranians, the neighboring Arabs, and most Europeans. The frequency of ABO and Rh phenotypes in Kurds appears to be intermediate between eastern (Asian) and western (Caucasian) data.

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Disclosure

The author reports no conflicts of interest in this work.

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