

The Significant High Prevalence of Blood Group 'O' in Yam Tribe of Najran City, the South Province of KSA



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Abstract

Introduction: ABO and Rhesus (Rh) blood groups are clinically important in blood transfusions and organ transplantations. They have also been employed as genetic markers in population genetics and anthropological studies. The distribution of ABO and Rh blood types has been investigated in several populations (tribes) of various parts of KSA but not "Yam tribe" in Najran province.

Aim of this study: is to investigate the frequencies of ABO and Rhesus D Rh (D) blood groups in male students from Najran province only, and to assess if there are any differences in their blood grouping in comparison with population from other areas of KSA.

Methods: A total of 593 male students (from Al-Ghad International College for Applied Medical Sciences in Najran- KSA) are involved in this study.

Results: It revealed that the most common blood group is O (69.47%), and the next common group is A(24.3 %), while B(4.04%) and AB(2.19%) respectively were the least. The frequency of Rh-positive blood group is 90.56%, while Rh-negative is 9.44%.

Conclusion: The results demonstrated an exceptional high level of 'O' group (70%) whether in comparison with previous studies concerning blood groups in Saudi population in other areas of KSA which is less than 50%, or with the population worldwide of 44%. The proportions of these blood groups show considerable variation across geographic locations demonstrating the underlying genetic and ethnic diversity of human populations, and in specific that these students belong mainly to the same tripe "Yam", and the consanguineous marriages are very common among them.

Keywords: ABO; Rh; Blood groups; Yam tribe; Najran; Saudi Arabia

Abbreviations: Rh: Rhesus; Rh+: Rh-positive; Rh-: Rh-negative; KSA: King Saudi Arabia

Introduction

In 1901, Austrian scientist Karl Landsteiner described the first human blood group ABO system [1] for which he was awarded the Nobel Prize in the year 1930. This was the most important achievement in the history of transfusion services. Forty years later, i.e. in 1940 both Landsteiner and Weiner discovered the Rhesus (Rh) blood group system [2]. The genes of ABO and Rh (D) are located on chromosome 9 and 1 respectively [3,4].

ABO and Rh blood groups are clinically important in blood transfusions [5,6], forensic pathology [7,8] and organ transplantations [9]. They have also been employed as genetic markers in population genetics and anthropological studies [10,11]. Furthermore, blood group has some association with diseases like duodenal ulcer, cancer, diabetes mellitus, urinary tract infection, Rh incompatibility, blood diseases and ABO incompatibility of newborn [12-18].

The distribution of ABO and Rh blood types has been investigated in a number of populations around the globe. The proportions of these blood groups show considerable variation across geographic locations demonstrating the underlying genetic and ethnic diversity of human populations [19-22].

There are many studies concerning the distribution of ABO blood groups in various areas of Saudi Arabia [23-28], but only in 2002 Al-Himaidi and Umar [24] investigated the distribution of ABO and Rh blood groups in different areas of Saudi Arabia according to the tribal location. They demonstrated variations in the distribution of ABO and Rh groups, with group O is the most frequent followed by A, B, and AB as shown in Table 1.

To the best of our knowledge, the distribution of ABO and Rh blood groups has not been studied in Najran city and in specific in Yam tribe. Therefore, the present study was done to document the frequency of ABO and Rh blood groups in this region.

Table 1: Demonstrates the distribution of ABO and Rh blood groups in various ethnic and geographical areas of Saudi Arabia [24].

Regions of KSA	Tribes	No. Observed	% Rh+	% Rh-	Blood groups and their %			
					O	A	B	AB
North	Shammary & Enizy	199	91.45	8.55	49.25	24.62	22.61	3.52
East	Motary, Ejman, & Dosary	168	94.05	5.95	47.62	21.43	26.79	4.16
Middle	Ottabi, Kahtani, Enizy & Motary	396	90.91	9.09	48.48	24.50	20.45	6.57
West	Harpy, Johnny, Hejazy and Bokhary	233	91.42	8.58	38.20	33.90	24.90	3.00
South	Ghamdiy, Zahrani, Asmmary & Kahtani	291	89.70	10.30	52.23	33.68	11.34	2.79
Total & %		1287	91.22	8.78	47.48	27.89	20.36	4.27

Subjects and Methods

Area of study

The study was performed at Al-Ghad International College for Applied Medical Sciences in Najran- KSA.

Subjects

Over ten months period, a total of 593 male students belonging to Yam tribe in Najran city, the south province of Saudi Arabia, were involved in this study.

Ethical Consideration

The protocol was submitted and approved by the Research Ethical committee of Al-Ghad International College for Applied Medical Sciences in Najran- KSA.

Collection of blood sample

The blood samples were collected by finger prick with sterile lancet, after warm and clean the puncture sit with 70% ethyl alcohol.

Procedure

A drop of monoclonal anti-A, anti-B and monoclonal/ polyclonal anti-D (Lorne Laboratories, UK) was added to a drop of finger prick blood on clean slide and mixed well. Results of

agglutination were recorded immediately for ABO blood groups and after 2 minutes in Rh(D).

Statistical analysis

Statistical analysis of study variables was carried out using SPSS software version 20 (ChiSquare test independence was used to study the association between the frequency of ABO blood groups and the various Saudi Arabia regions and tribes).

Results

The spectrum of blood groups distribution in Yam tribe of Najran city is shown in Table 2. It demonstrates the significant high prevalence of blood group O (69.47%) with $P < 0.001$, followed by A(24.3%), while B(4.04%) and AB(2.19%) respectively were the least groups.

The distribution of ABO in this result demonstrates a considerable variation with the ethnic tribes in other areas of Saudi Arabia [24] as shown in Figure 1. Our result shows a significant high frequency of O group and a significant low frequency of B group in Yam tribe in comparison with other tribes in other areas of Saudi Arabia ($P < 0.001$).

The results also demonstrated that the frequency of Rh-positive (Rh+) blood group is 90.56%, while Rh-negative (Rh-) is 9.44% as shown in Figure 2.

Table 2: The spectrum of blood group ABO and Rh distribution in Najran Yam tribe. (n=593).

ABO Spectrum (No. & %)								Rh Spectrum		Subject's Total No.
O+	O-	A+	A-	B+	B-	AB+	AB-	Rh+	Rh-	
372	40	132	12	20	4	13	0	537	56	593
62.73%	6.74%	22.28%	2.02%	3.37%	0.67%	2.19%	0%	90.56%	9.44%	
O= 69.47%		A= 24.30%		B= 4.04%		AB= 2.19%				

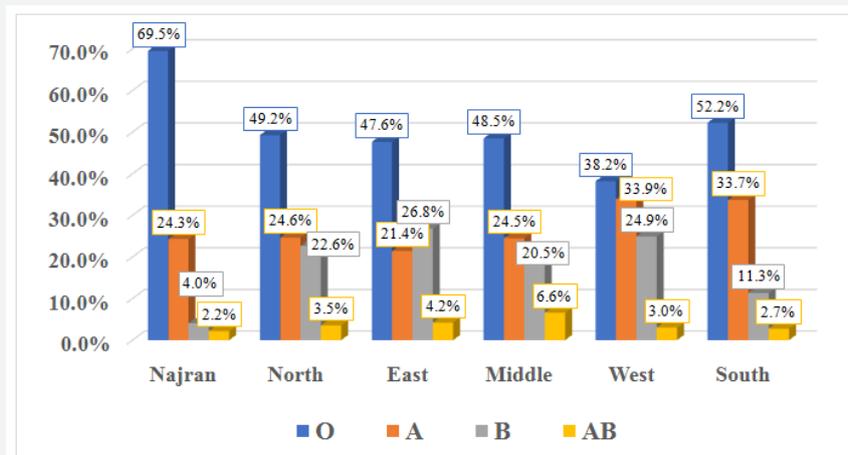


Figure 1: Comparison study on frequency of ABO groups at different ethnic and geographical areas in Saudi Arabia. Showing the significant high prevalence of O group and a significant low prevalence of B group in Najran city ($P < 0.001$).

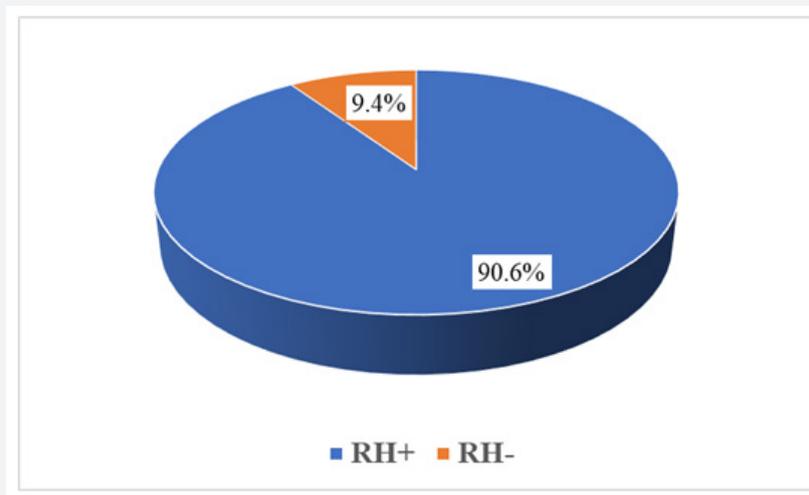


Figure 2: Showing the distribution of Rh blood group in Yami tribe (Najran city).

Discussion

A and B types were likely to be inherited as simple Mendelian dominant traits [20]. Literature reports suggest wide geographical and racial disparity of ABO and Rh antigens and genes from one population to another all over the world [29-34]. Blood type O is the most common worldwide, followed by group A. Group B is less common, and group AB is the least common. Blood group A is associated with high frequencies in Scandinavia and many European countries, and with its highest frequencies occur in some Australian Aboriginal populations and the Blackfoot Indians of Montana, the US [6,35-41]. While blood group B has its highest frequency in central Asia and neighboring south Asia such as Buryats (Siberia), Pakistan, Bangladesh, and in certain regions of India reaching 40% or more while group O or A with less than 30% [42-47].

The gene frequencies for ABO have been studied in Arabian Gulf including Saudi Arabia [48,49]. The gene frequencies in Saudi Arabia vary with each region of the country and in different tribes [50-52]. Furthermore, there are some studies on the distribution of blood groups in Saudi Arabia demonstrating that the most common ABO blood group among Saudi populations was found to be group O followed by A, B, and AB types respectively, with variation in their percent from one area to the other such as group O from 38.2% up to 52.2% [23-26].

The most recent studies which have been done in 2017 by Alwasaidi et al. [27] and Farshori et al. [28] demonstrate that the distribution of O group in Saudi population is about 46% which agrees with the frequency of O group in the world population which is about 44% [42].

Our results show that the most frequent ABO blood group in Yam tribe (Najran city) is O type followed by A, B, and AB types respectively which agree with that found in other areas of Saudi Arabia, but at the same time this result demonstrates a significant higher frequency of blood group O (69.47%) in comparison with about 46% in other regions of Saudi Arabia or in the world population which is about 44%. The result also demonstrates a significant low frequency of B group (4.04%) in comparison with about 18% in world or Saudi Arabia populations, while blood group A and AB are within the frequencies of other areas in Saudi Arabia or worldwide populations [23,24,26-28,42].

Furthermore, this result shows that the frequency of Rh+ and Rh- blood groups are 90.56% and 9.44% respectively in Yam tribe, which agree with those found in other tribes of Saudi population or with world population.

It is clear that the ABO blood distribution in Najran city is unique and might reflect the ABO genetic makeup and distribution in their ethnic population. Knowing that the main tribe in Najran province is Yami tribe and the consanguineous marriages are very common, which could explain more the high prevalence of blood group O and the very low blood group B. As the student which have been involved in our study belong also to Yam tribe.

Conclusion

The results demonstrated an exceptional high frequency of 'O' group which is 70% in Yam tribe (Najran city) in comparison with less than 50% in Saudi Arabia or worldwide population. In addition, the blood group B shows a very low frequency (4.04%) in comparison with the B groups populations whether in Saudi Arabia or worldwide which is about 18%. Therefore, we can say that the ethnic and genetic factors play an important role in the differences of blood groups distribution in different populations whether in Saudi Arabia or around the globe.

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