
Anthropological studies among Libyans of Fazzan Province: ABO and Rh Systems.

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Abstract

Background: ABO and RH D systems are related to ethnicity and diseases.

Objectives: To study the ABO and Rh groups in Fazzan area where the population are of mixed origin.

Setting: The 2nd March Hospital's blood transfusion unit.

Material and Methods: The population in this study are those attending delivery room and Obstetric units and those who donate blood during the period between January 2003 and December 2003.

Results: Blood group O is found to be the most frequent blood group in this study(48.2%): 50.4 % in male donors and 45.9 in female recipients. ORh+ is 42.4%in female recipients and 45.4% in male donors. On the other hand, the least frequent group is group AB (4.8%). The highest percentage of blood group O is found in Obari area (63.5%) and the least in Morzok (41%). About ninety two per cent (92.3%) of the donors are Rh positive, and 91% of the recipients are Rh positive. Both recipients and donors are 91.6 % Rh positive. Attendants with Rh negative were 8.4%: female recipient are 9% and male donors are 7.7%. There is no significant difference in the distribution of blood groups and Rh D system between male donors and female recipients.

Conclusion: Our results show that the most frequent blood group in Libyans of Fazzan province is group O and is nearly similar to that of Africans. Blood group A is similar to that of Arabs and Africans. Blood group B is nearer to Africans more than Arabs. The least frequent blood group is AB which is similar to that of Africans. The study of blood groups in Libya is very important for Blood Banks and transfusion service policies. Knowledge of blood group phenotype distribution is also important for clinical studies (for example disease association) as well as for population studies.

Introduction

Blood transfusions were first attempted around 1600 by transfusing animal Blood into humans. It proved disastrous. In the early 1800s an English obstetrician, James Blundell, came up with the idea of human Blood for human beings. In 1909, Karl Landsteiner classified the blood of human beings into the now well-known A, B, AB, and O groups. These human blood group antigens are unique, inherited polymorphisms on the extracellular surface of red blood cells. They have been used as genetically discrete markers of human polymorphism. Many of these antigens have been identified, the genes cloned, and their biological significance elucidated.¹

The ABO and Rhesus blood group systems remain the most important blood group systems clinically.² The medical literature contains a large number of publications attempting to correlate blood groups with disease.^{3,4,5,6,7,8} Many of these reports are poorly documented and have limited scientific validity.⁹ For example, Epidemiological

studies demonstrated that individuals who are blood group O positive are more likely to develop peptic ulcers.¹⁰ However, Keller et al. (2002)¹¹ and Robertson et al (2003)⁵ found no association between secretor status or specific ABO blood group on the one hand, and H. pylori infection or occurrence of gastroduodenal ulcers on the other.

The study of ABO and Rhesus blood group systems may provide a basic but useful information concerning many ethnic groups.^{12,13,14} Blood groups have provided anthropologists with a tool to study polymorphism in the different peoples across the world and provided geneticists with inherited markers to understand complex mechanisms of linkage and disease inheritance.¹

The distribution of ABO blood groups varies in the different geographical and ethnic groups.¹⁵ Race is thought to be one of the factors determining the level of ABO antibodies.¹⁶ For example, proto-Australoid

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group is characterized by a high incidence of group A.¹⁷ Africans, Asians, and Arabs are characterized by high incidence of group O.¹⁸ The history of early tribal contact, as well as archaeological and linguistic evidence, indicate that significant movements of people occurred between the different region of the country and provided opportunities for genes to be introduced from Arabs and, Africans.

Libya has borders with Egypt in the East, and Tunisia in the west. In Egypt ,the Eastern Hamitic stock (Egyptians, Bedouins, and Berbers) are 99%. In Tunisia most of the population is Arab-Berber (98%). The Southern borders of Libya is surrounded by Algeria (Arab-Berber 99%), Niger (Hausa 56%, Djerma 22%, Fula 8.5%, Tuareg 8%, Kanouri 4.3%, Arab, Toubou, and Gourmantche 1.2%), Chad (Arabs, Toubou, Hadjerai, Fulbe, Kotoko, Kanembou, Baguirmi, Boulala, Zaghawa, and Maba); and the Sudan (black 52%, Arab 39%, Beja 6%).¹⁸ The *Toubuo*, is part of a larger grouping of around 215,000 *Toubuo* in northern Chad, Niger, and Sudan. A significant number of sub-Saharan Africans live in desert and coastal communities, mixed with Arabs and Berbers. Another distinct but numerically small group of blacks, the *harathin* (plowers, cultivators) have been in the Saharan oases for millennia. About 10,000 *Tuareg* nomads live scattered in the southwest desert, wandering in the general vicinity of the oasis towns of Ghat and Ghadamis. They claim close relationship with the much larger Tuareg population in neighboring Algeria and with other Tuareg elsewhere in the Sahara.¹⁹

In Africa, the genetic differentiation of the Negroes in relation to their linguistic affiliation and geographic localization is evident. Papiha et al (1997)²⁰ found that the racial differences between tribes are more likely to be maintained by genetic drift, admixture, and inbreeding. For example, in the Sudan, the Nuba and Nilotes have been found to have Negroid genetic characteristics, while the Fur are intermediate between the Arabs and Negroids.²¹ Similarly, the Egyptian population appears as a mixture of African, Asiatic and Arabian characteristics.²² The study of Bedouin and non-Bedouin Jordanians confirms their Arab characteristics with a small degree of African admixture.²³

The aim of the work:

Knowledge of the frequencies of the different blood groups in Fazzan province, where

Africans and Arabs were mixed together, is very important for Blood Banks and transfusion service policies. Knowledge of blood group phenotype distribution is also important for clinical studies (for example disease association), as well as for population studies.

Materials and Methods:

A retrospective study using data from the 2nd of March Hospital's blood transfusion unit was done. All persons donate blood and those attended the obstetric ward and delivery room between January 2003 and December 2003 were included in the study. 2380 persons from different regions of Fazzan province (1249 male donors, and 1131 female recipient were used in this study. Data from the large six towns; Sebha, Alshati, Obari , Morzok, Gatron and Ghat were recorded. The results were analyzed statistically using Chi squared test, P values of < 0.05 were considered significant.²⁴

Results:

The frequency of blood group A was 29.1% in male donors, 31.5 % in female recipients and 30.3% in both donors and recipients. The frequency of blood group B was 16.6%:(15.3% in male donors and 18 % in female recipients). Blood group O was found to be the most frequent group in this study(48.2%): 50.4 % in male donors and 45.9 in female recipients. On the other hand, the least frequent group was group AB 4.9% (5.2% in male donors and 4.6% in female recipients, (Table 1).

There was no significant difference in the distribution of blood groups between male donors and female recipient ($\chi^2 = 3.1, P > 0.05$) (Table 2).

The distribution of blood groups in different region of Fazzan province showed that blood group A is more prevalent in Gaht (33.3%),and the least percentage was found in Obari (21.9). The highest percentage of blood group B was found in Morzok (24.6%), while the least percentage was found in Ghat (11.1%). AB Group was also more common in Gaht (11.1%),and less common in Obari (4.2%). On the other hand, the highest percentage of blood group O was found in Obari area (63.5%) and the least in Morzok (41%), (Table 3).

About ninety two per cent (92.3%) of the donors were Rh positive, and 91% of the recipients were Rh positive. Both recipients and donors were 91.6% Rh positive. Attendants with Rh negative were 8.4%:

female recipient were 9% and male donors are 7.7%, (Table 4). There was no significant difference in the Rh distribution between male donors and female recipients ($X^2 = 7.03$, $P > 0.05$), Table 4.

Overall frequency of ABO and Rhesus blood groups were the following: O-positive 43.9%; A-positive 28.2%; B-positive, 15%; AB positive 4.4%; O negative 4.3%; A negative 2%; B-negative 1.7%; and AB negative 0.5%,(Table 5).

Table1:Distribution of blood groups in Donors and Recipients of Fazzan province

Blood groups	Donors (n=1249)	Recipients (n=1131)	Total Number of attendants (n=2380)	Total Percentage
A	364 (29.1%)	356 (31.5%)	720	30.3
B	191 (15.3%)	204 (18%)	395	16.6
AB	65 (5.2%)	52 (4.6%)	117	4.9
O	629 (50.4%)	519 (45.9%)	1148	48.2

Table 2: Blood Groups distribution in Male donors and Female recipients of Fazzan province* .

	Group A	%	Group B	%	Group AB	%	Group O	%	Total
Males	364	29.1	191	15.3	65	5.2	629	50.4	1249
Females	356	31.5	204	18.0	52	4.6	519	45.9	1131

* $X^2=3.1$, $P>0.05$.

Table 3: Distribution of Blood Groups In male Donors of different regions of Fazzan province (n=1234)

Region.	No.	A	B	AB	O
Sebha	905	29.6%	14.6%	5.0%	50.8%
Morzok	61	27.9%	24.6%	6.6%	41.0%
Obari	96	21.9%	19.4%	4.2%	63.5%
Alshati	149	29.5%	14.5%	7.4%	43.6%
Ghat	9	33.3%	11.1%	11.1%	44.4%
Gatron	14	28.6%	14.3%	-----	57.1%

Table 4: Rh in Male donors and Female recipients*

	Males		Females		Total	Percentage
	No.	%	No.	%		
Rh negative	97	7.7%	102	9.0%	199	8.4%
Rh positive	1152	92.3%	1029	91%	2181	91.6

* $X^2=7.3$, $P>0.05$.

Table 5: Rh distribution in Male donors and female recipients of Fazzan Province*

Blood groups	Rh in blood donors		Rh in blood recipients		Total%
	No.	%	No	%	
A positive	346	27.7	326	28.8	28.2
A negative	18	1.4	30	2.7	2.0
B positive	180	14.4	176	15.6	15
B negative	11	0.9	28	2.4	1.7
AB positive	59	4.7	48	4.2	4.4
AB negative	6	0.5	4	0.4	0.5
O positive	567	45.4	479	42.4	43.9
O negative	62	5.0	40	3.5	4.3

* $X^2=0.11$, $P>0.05$

Discussion:

This study shows that the most frequent blood group is group O (48.2%): ORh+ 43.9%,ORh-4.3%. The frequency of blood group A is (30.3%): ARh+ 28.2%, ARh-2%, while, group B is (16.6%): B Rh+ 15%, BRh-1.7%. The least frequent blood group is group AB (4.9%):ABRh+ 4.4%,ABRh- 0.5%. These findings is in agreement with those of Sudan, Kenya, and Saudi Arabia.^{25,26,27}

The results of the present study differs from that of Syrian Arabs,²⁸ Nairobi Kenya¹³ and West Africa¹² in the frequency of ABO groups. The frequency of ABO blood groups in Syrian Arabs is Group A (46.25%), Group O (37.5%) Group B (13.13%) and Group AB is (3.12%). In Nairobi_Kenya, Mwangi (1999)¹³ finds that Africans are characterized by high frequency of O (49%), B (25%), A (22%) and AB (5%). The frequency of ABO blood groups in West Africa is Group O (46.6%), Group B (25.95%), Group A (23.05%)and Group AB (4.4%).¹²

The inhabitants of the Fazzan area is a mixture of Arabs and Africans, their anthropometric features substantiate the study of their blood markers. The present study shows a striking predominance of blood group O in Obari (63.5%). Blood group A is higher in Sebha (29.6% and Alshati (29.5%). Blood groups B and AB are the highest in Morzok (24.6%) and Alshati (7.4%)respectively. As compared with Beckman (2004).¹⁸ the population of Obari resembles that of the Sudanese (62%), and the population of Sebha and Alshati resemble that of Africans and Arabs. Furthermore, the population of Morzok is midway between Arabs (29%) and Africans (19%). Blood group AB is also the highest in Alshati, and is higher than both Arabs (6%) and Africans (5%).

Anthropometric measurements reveals overall homogeneity of Tripoli, Benghazi and Sabha southward in The Sahara. There is a closer similarity in the coastal region to adjacent North African populations, and Negroid influence in the Sahara Libyans.²⁹ This assumption is conceivable considering the racial history of Libya. On the contrary, the relative lack of the African component in the gene pool of in some Libyan communities showed that they have interbred very little, if at all, with their Negroid neighbors.³⁰

The present study shows that blood group O is predominant in both male donors (50.4%) and female recipients (45.9%). There is no significant difference in the distribution of blood groups and Rh D system between male

donors and female recipients. However, in women of Russian Federation the predominance of blood group A is the most pronounced.³¹ Among the Nomads of the Arabian Peninsula, and the Berbers of the Atlas Mountains, two old populations, the frequency of the blood group O gene is high. Africans, on average, have more O genes and less A genes than do Europeans. So it can be seen that the gene carried by people who are blood group O is ancient by evolutionary standards.³²

The Rh positive in Fazzan area is 92%. This is in agreement with Arabs of Saudi Arabia (93%).²⁷ Similarly it has been concluded that RhD antigen has a prevalence in Africans.¹³ On the other hand, the Rh antigens in the series studied by Lyko et al (1992)²⁶ is the same as the findings of Kulkarni et al (1985),¹² 96.1% and 96.4% respectively.

The most plausible interpretation of these results is that the population of Fazzan area may be a mixture between Arabs and Africans. Beckman (2004)¹⁸ stated that the distribution of ABO blood group in Arabs is Group O:34%, Group A: 31% ,Group B: 29% and Group AB: 6%. Africans have Group O :46%, Group A: 30%, Group B: 19% and Group AB :5%. As compared with Beckman (2004)¹⁸ the present results show that blood group O is nearly similar to that of Africans. Blood group A is similar to that of Arabs and Africans. Blood group B is nearer to Africans more than Arabs. The least frequent blood group is AB which is similar to that of Africans.

Bosch et al (1997)³³ found that the main feature of the genetic landscape in northern Africa is an east-west pattern of variation pointing to the differentiation between the Berber and Arab population groups of the northwest and the populations of Libya and Egypt. Moreover, Libya and Egypt show the smallest genetic distances with the European populations. The most isolated groups (Mauritanians, Tuaregs, and south Algerian Berbers) were the most differentiated and, although no clear structure can be discerned among the different Arab- and Berber-speaking groups, Arab speakers as a whole are closer to Egyptians and Libyans. By contrast, the genetic contribution of sub-Saharan Africa appears to be small.

Differences in ABO blood groups distribution between different parts of Fazzan province together with environmental factors can determine predisposition of individuals

belonging of these subethnic groups to some diseases.

Conclusion:

Our results show that the most frequent blood group in Libyans of Fazzan province is group O and is nearly similar to that of Africans. Blood group A is similar to that of Arabs and Africans. Blood group B is nearer to Africans more than Arabs. The least frequent blood group is AB which is similar to that of Africans. The study of blood groups in Libya

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