

Distribution of ABO and Rhesus (RHD) Blood Groups in Al-Jouf Province of the Saudi Arabia

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ABSTRACT ABO and RHD blood grouping was carried out on 400 Saudi adult male subjects, 100 each from Sakaka, Domaht Al-Jandal, Al-Qurayat and Sweer cities of the Al-Jouf Province of the Saudi Arabia. Finger prick blood samples were tested for both the blood groups by routine slide method. In the total material studied here from the Al-Jouf Province, blood group O was found highest (0.628), followed by A (0.193), B (0.179) and AB (7.3%) while the percentage of RHD Positive (0.705) was greater than RHD negative (0.295). This study could have significant implications for the major blood banks in Al-Jouf area where certain blood groups are needed more than others in emergency conditions. In addition, the data generated would be helpful to the researchers to explore the factors responsible for the observed distribution patterns of the studied blood group systems.

INTRODUCTION

A number of blood group polymorphisms have been discovered in man (Race and Sanger 1975) but the most important is the ABO blood groups. Landstainer (1900) demonstrated three blood groups according to antigens present on the surface of red cells viz., A, B and O and showed that an individual possessed antibodies against those antigens which lacked on his red cells. The fourth group of the system was discovered couple of years later by his pupils von Decastello and Sturli (1902). Several other red cell blood groups hence have been discovered but the rhesus (RHD) blood groups are of utmost importance clinically and anthropologically. Cells which have Rhesus antigen on their surface are described as Rhesus positive while those without it are known as Rhesus negative. Both ABO and RHD are useful in blood transfusion and organ transplantation. They are well defined genetic markers employed in popula-

tion genetics and anthropological studies (Sigmon 1992). The distribution of these two blood groups has been repeatedly investigated in various populations all over the world during the last several decades (Mourant et al. 1976) and their frequencies exhibited considerable variation in different geographic locations, reflecting the underlying genetic and ethnic diversity of human populations (Cavalli-Sforza et al. 1994).

There is no study to document the distribution of ABO and RHD blood groups in Al Jouf Province of the Saudi Arabia in West Asia. The present study was therefore planned to investigate these two blood group polymorphisms in Sakaka, Domaht Al-Jandal, Al-Qurayat and Sweer cities of the Province. The main objective of our study is to make aware the Primary Health Care (PHC) centers about the distribution pattern of ABO and Rhesus (RHD) blood groups in people of Al-Jouf Province. This study will be helpful to such centres and blood banks in this region.

MATERIAL AND METHODS

A total of 400 healthy Arab ethnic male persons aged between 20 and 50 years were randomly selected from Primary Health Centers (PHC) of four major cities (Sakaka, Domaht Al-Jandal (Domah), Al-Qurayat and Sweer) of Al-

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Jouf Province of Saudi Arabia. The Al Jouf Province forms a vital position of the North Arabian and Syrian desert and is enclosed by sandstone hills; its oases have played an important role in the contacts between the Arabs in the Peninsula and the people of the Fertile Crescent. Al Jouf was an extremely important center and a summer camping ground for the nomads in ancient history. It was a confluence of various cultures. Sakaka, the capital city of the province, Al-Qurayat, Sweer and Dumat Al Jandal (Domah) are the major cities of Al Jouf Province. Dumat Al-Jandal was an important caravan town and agricultural oasis. The blood samples were analysed as per instructions provided by BioTec Laboratories, UK. The statistical data analysis was carried out with the help of SPSS 17.0, Windows version software to calculate normal frequency percentage and one way ANOVA analysis for comparing the statistical significant differences of ABO and RHD blood groups.

RESULTS

The distribution of ABO and RHD blood groups in the studied areas of Al Jouf Province of the Saudi Arabia is represented in Tables 1 and 2, respectively. In our study, blood group O

was found predominant (0.628), followed by A (0.193), B (0.179) and AB (7.3%). Thus, in ABO blood groups among the subjects of the four selected cities, the pattern observed was $O > A > B > AB$. As for RHD blood groups RHD positive subjects (365) were over 10 times more than RHD negative subjects (35); overall 8.8% subjects were found to be negative (0.295). In this study we computed one way ANOVA analysis for comparing the statistical significant differences of ABO blood groups (O, A, B, AB) and RHD blood groups (RHD positive, negative) among the selected cities. No significant difference was found in ABO blood groups in compared four major cities ($F(3,396)=1.117$, $P>0.05$). Similarly, in the case of RHD blood groups also no significant difference was noticed among the people of the studied cities ($F(1,398)=2$, $P>0.05$). The distribution of ABO blood groups in both RhD positive and negative subjects is presented in Table 3. Interestingly this illustrates that RHD negative incidence was recorded highest in B blood group subjects (4.5%), followed by O (2.0%), A (1.8%) and AB (0.5%) subjects.

The distribution of ABO blood groups in the present material from Al-Jouf Province of the Saudi Arabia compared with some neighbouring and other countries and it has been obser-

Table 1: Distribution of ABO blood groups in different cities of Al-Jouf Province of the Saudi Arabia

City	O			A			B			AB	
	Observed (n)	Observed (%)	Allele frequency	Observed (n)	Observed (%)	Allele frequency	Observed (n)	Observed (%)	Allele frequency	Observed (n)	Observed (%)
Sakaka	48	12	0.691	23	5.8	0.151	24	6	0.158	5	1.3
Domah	35	8.8	0.603	29	7.3	0.196	30	7.5	0.201	6	1.5
Al-Qurayat	40	10	0.620	29	7.3	0.211	22	5.5	0.169	9	2.3
Sweer	56	9	0.595	29	7.3	0.211	26	6.5	0.194	9	2.3
Total	159	39.8	0.628	110	27.5	0.193	102	25.5	0.179	29	7.3

Table 2: Distribution of RHD blood groups in different cities of Al-Jouf Province of the Saudi Arabia

City	RHD Positive			RHD Negative		
	Observed (n)	Observed (%)	Allele frequency	Observed (n)	Observed (%)	Allele frequency
Sakaka	86	21.5	0.6259	14	3.5	0.3741
Domah	94	23.5	0.7551	6	1.5	0.2449
Al-Qurayat	92	23.0	0.7172	8	2.0	0.2828
Sweer	93	23.3	0.7355	7	1.8	0.2645
Total	365	91.2	0.705	35	8.8	0.295

Table 3: Distribution of ABO and RHD blood groups in people of Al-Jouf Province of the Saudi Arabia

<i>ABO blood group</i>	<i>RHD blood group</i>	<i>Number observed</i>	<i>% Observed</i>
O	RHD +ve	151	37.8
	RHD -ve	8	2.0
	Total	159	39.8
A	RHD +ve	103	25.8
	RHD -ve	7	1.8
	Total	110	27.5
B	RHD +ve	84	21.0
	RHD -ve	18	4.5
	Total	102	25.5
AB	RHD +ve	27	6.8
	RHD -ve	2	0.5
	Total	29	7.3
Total	RHD +ve	365	91.2
	RHD -ve	35	8.8
	Total	400	100.0

ved that the distribution pattern of ABO blood groups similar to our study was reported in Egypt (Awny et al. 1965), Jordon (Haninia et al. 2007), Nigeria (Gaertner et al.1994), Kenya (Lyko et al. 1992) and Eastern region of Saudi Arabia (Bashwari et al. 2001). However, other countries such as Syria (Sakharov and Nofal'Kh 1996), Lebanon (Nasif 1953), Israel (Mourant et al. 1976), and Jordan (Hanania et al. 2007) have shown a different distribution pattern in which blood group A is predominant. This spectrum difference in distribution of ABO blood groups is mainly attributable to the ethnic differences, sampling error and natural selection, among others. Phenotype and Allele frequency of Rhesus blood groups among four cities shown in Table 2.

DISCUSSION

The study of distribution of blood groups is important as it plays a vital role in genetics, blood transfusion, organ transplantation, genetic research, human evolution (Harvey and David 2005), forensic pathology and some groups have shown associations with diseases like duodenal ulcer (Ziegler et al. 2004), diabetes mellitus (Akhtar et al. 2003), urinary tract infection (Qureshi and Bhatti 2003) and Rh and ABO incompatibilities of newborn (Mourant et al. 1978). Forensic application of blood group studies is of great value in detection of crime. Determination of paternity is another feature in forensic medicine after studying the

blood group serology (Jolly 2000). As blood group determination is important in clinical practice it was felt desirable to find out the prevalence of different blood groups in Al-Jouf Province of the Saudi Arabia from where no earlier serological data are available. In our study, blood group O was found predominant (0.628) and AB was stands on lowest side (7.3%). Similar distribution pattern of ABO blood groups was reported in Egypt, Jordon, Nigeria, Kenya and Eastern region of Saudi Arabia. However, other countries such as Syria, Lebanon, Israel and Jordan have a different ABO distribution pattern in which blood group A was predominant. This may be attributed to their different ethnic background, besides sampling error, and natural selection. Similarly in agreement with previous studies (Bashwari et al. 2001; Hanania et al. 2007; Sakharov and Nofal'Kh 1996), RHD positive individuals showed the highest percentage (0.705) in this study.

CONCLUSION

From our point of view, the present study is original in that, it is the first comprehensive study that documented the distribution of ABO and RHD blood groups among four cities of Al-Jouf Province of the Saudi Arabia. This study could have significant implications for the major blood banks of Al-Jouf where certain blood groups are needed more than others in emergency conditions. Furthermore, the data generated in this study would be helpful to the researchers in the field of population genetics to explore the factors responsible for the observed distribution patterns of these genetic markers in this part of West Asia.

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