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Research Article

FREQUENCY OF RH NEGATIVITY AND ITS CLINICAL SIGNIFICANCE IN SAUDI POPULATION IN THE MAKKAH REGION

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Abstract:

Background: The Rh antigen is highly immunogenic antigen, it has a relationship with Rh hemolytic disease of the newborn (Rh HDN).

The aim of this study was to detect the frequency of Rh negativity and Rh HDN in Saudi Arabia in the Makkah region.

Methods: This study included 500 subjects, 474 were Saudi, and 26 were non-Saudi. They were 192 men and 308 women. All were subjected to multiple questionnaires which include, age, sex, marital status, number of children if the participant was married, blood group, the Rh type of the participant and his or her partner if married. History of Rh HDN, history of anti-D injections to Rh negative mothers and history of exchange transfusion of the babies of Rh-negative mothers.

Results. The Rh-positive individuals were 427 (85.4%) and the Rh negative were 73(14.6%). The Rh negative were 21 male 52 female. 36 of the Rh-negative females were married of which 30 were married to Rh positive partner. 11 (37.9 %) of the babies of the Rh married negative women developed jaundice after delivery but only 2 (8%) need exchange transfusion.

Conclusion: The frequency of Rh negativity in the Makkah city are 14.6 %. 37.9 % of babies of Rh negative mothers developed Rh HDN.

keywords: Rh positive, Rh negative, Rh HDN

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INTRODUCTION:

The Rhesus blood group is one of the most complex blood groups known in humans after ABO blood group (Dean, 2005). The rhesus factor system was first discovered by Karl Landsteiner and Alexander S. Wiener in 1939 and confirmed in 1940. The Rh blood group code for five antigens D, C, c, E, and e, and it consists of 3 genetic loci each with 2 major alleles. The terms Rh positive and Rh negative refer to the D antigen. (Lato et al., 2005; Singelton et al., 2000). People having Rh positive phenotype, are homozygous (CDe/CDe) in the rate of 45%, and 55% is heterozygous (CDe/cde) for the RhD gene. Homozygous deletion of the RhD gene results in the Rh-negative phenotype (Singelton et al., 2000).

The connection between hemolytic disease of the newborn and sensitization to Rh discovered by Levine et al, in 1941. The Rh negative pregnant woman with Rh positive fetus, the mother may produce antibodies to the fetal Rh antigens, especially during the third trimester and delivery, leading to hemolytic disease of the fetus and newborn in a following pregnancy (Wright and Burton, 2009). RhD antibody was and still is the most prevalent cause of severe hemolytic disease of the newborn (Van der School et al., 2003). All pregnant mothers ought to have testing performed, including a blood classification (ABO, RhD) and indirect Antiglobulin test in negative pregnant women that recognize IgG antibodies (Kamphuis et al., 2008). Previous studies were done in Saudi population, one in the AL-Madinah Almonawarah, they reported that the Rhesus factor was positive in 87.9% and negative in 12.1%. (Albilali et al., 2017). Another study done in the Makkah region, they reported that the Rhesus factor was positive in 98.0% and negative in 2%. (Dahlawi. et al., 2017). International studies were done on the frequency of the RhD negativity estimated that it is higher in Caucasians (15%) than in blacks (8%) and is uncommon in Asians (1%). (Dean, 2005)

Aim of study

The aim of this study was to detect the frequency of Rh negativity in Saudi Arabia in the Makkah region and to detect the percentage of Rh hemolytic disease of the newborn.

SUBJECTS & METHODS:

Subjects

This study was carried out from April 2017 to May 2018; it included 500 subjects.

The Umm Al-Qura University ethics committee approved the protocol of this study. All participants in this study gave informed consent according to the declaration of Helsinki. The data for this study were collected from ALnoor Hospital, King Fasil Hospital and the students of the faculty of medicine, Umm Al-Qura University in Makkah, Saudi Arabia.

Sample collection

The data were collected from all participants without any exclusion.

METHODS:

A questionnaire was applied to everybody, which include age, sex, marital status, number of children if married, blood group, Rh type and if the person was married the Rh type of the partner was taken. History of Rh hemolytic disease of the new born, history of anti-D injections to Rh negative mothers and history of exchange transfusion of the babies of Rh negative mothers.

Statistical analysis

The statistical analysis of this study was done using SPSS program version 20. Quantitative data were described in the form of mean \pm SD for the normally distributed data. The median and range were used for the data that were not normally distributed. The comparison between groups was performed by using Student t-test for quantitative data and the chi-square test for the qualitative data. The significance level was set at 0.05.

RESULTS:

The results of this study are summarized in tables from 1 to 4

This study included 500 participants. They were 192 men and 308 women with male to female ratio of 1.0:1.6. Their mean age was 30.9 ± 10.7 years. Their median age was 27 years and it ranged from 15 to 73. Four hundred seventy-four was Saudi, 26 was non-Saudi. Two hundred forty-seven of them were single (49.4%) and 253 (50.6%) were married. The educational level of the participants was as follow 77.4% academic, 18.2% secondary, 3% intermediate and 1.4% primary. Table 1

Table 1: Clinical data of the participants

	Age	Nationality		Gender		Marital status		Educational level			
	Mean±SD median min-max	Saudi	Non-Saudi	Male	Female	Single	Married	Primary	Intermediate	Secondary	Academic
Number	500	474	26	192	308	247	253	7	15	91	387
percentage		94.8	5.2	38.4	61.6	49.4	50.6	1.4	3.0	18.2	77.4

The frequency of the blood group and Rh of the participants are shown in table2. The highest frequency was group O 51.8% (259) followed by blood group A 24.2% (121) then blood group B was 16.2% (81), then the AB blood group with frequency of 7.8% (39). Regarding the percentage of Rh-

positive individuals in our sample, it was 85.4% (427) while the percentage of Rh negative was 14.6% (73). In the positive group of Rh, 34.2% (171) were male and 51.2% (256) were female. In the negative group of Rh, 4.2% (21) were male and 10.4% (52) were female. Table 2

Table 2: The frequency of the different blood group and Rh in the whole participant

Blood group and Rh	Number	Percentage
A	121	24.2
AB	39	7.8
B	81	16.2
O	259	51.8
Rh -	73	14.6
Male	21	4.2
Female	52	10.4
Rh +	427	85.4
Male	171	34.2
Female	256	51.2

The comparison between male and female with regards to the Rh type of the married participants and their partner showed no significant difference $p > 0.05$. As 88.9% of male were positive and 11.1% were negative versus 81.8% and 18.1% in female respectively. In male partner 81.5% were positive,

14.8% were negative and 3.7% do not know the type of Rh. In female partner, 81.4% were positive, 13.1% were negative and 5.5% do not know the type. In addition, the comparison between male and female in the single group showed no significant difference. Table 3.

Table 3: The comparison between male and female with regards to the Rh type in the married and single group

	Male	Female	Significance
Married (n=253)			
Rh type	48(88.9%)	163 (81.8%)	.222 NS
Positive	6(11.1%)	36 (18.1%)	
negative			
Rh of partner			
Positive	44(81.5%)	162(81.4%)	.830 NS
Negative	8(14.8%)	26(13.1%)	
Do not know	2(3.7%)	11(5.5%)	
Single (n=247)			
Rh type	123(89.1%)	93 (85.3%)	.370 NS
Positive	15(10.9%)	16(14.7%)	
negative			

The association of the Rh-negative mother with different parameters studied table 4. Out of the 36 negative married women, 30 were married to Rh positive men and 6 to Rh negative. 72.4% (21) of the Rh-negative women gave a history of taking anti-D

injection after delivery of Rh-positive baby. 17.2 % (5) not taking the anti-D injections and 10.3% do not know. 37.9 % (11) of the babies of the Rh-negative women developed jaundice after delivery. 8 % (2) of the babies need exchange transfusion.

Table 4: The association of Rh-negative married mother with different parameters studied

Parameters	Jaundice & Rh HDN		Anti-D injections				Exchange transfusion of baby		
	Yes	No	Yes	No	Do not know	Missed	Yes	No	Missed
Number	11	19	21	5	3	1	2	23	5
Percent	37.9	62.1	72.4	17.2	10.3		8	92	

DISCUSSION:

The significance of the Rh blood group is related to the fact that the Rh antigens are highly immunogenic. Subject who are negative to the D antigen will develop antibodies when exposed to Rh positive antigen (Reid,et al.2004). The aim of this study was to detect the frequency of Rh negativity in Saudi Arabia in the Makkah city and to detect its association with Rh hemolytic disease of the newborn (Rh HDN).

In our study, the percentage of Rh negative was 14.6% and it is more frequent in females (10.4%) than males (4.2%) with no significant difference. Our findings are consistent with other studies done in Kingdom of Saudi Arabia. They demonstrated that Rhesus positive were higher than Rhesus negative. Amal et al,2014 in a study done in Tabuk reported that the frequency of Rh negative was 6.7 in male and 9.2 in female. In another study done by Abdullah et

al.2017 on healthy blood donors in Al Madinah Al Munawara, they reported that, 87.9% were positive and 12.1% were negative. In a study in Riyadh in patients who received blood for different reasons, the workers found that, the percentages of positive and negative Rh grouping phenotypes were 96% and 4%, respectively (Elsayid et al, 2015). In another study in Makkah city 2019, the Rh negative was 8.3 % in female and 7.6% in male (amal et al, 2019). In comparison, with Arab countries studies, our results of negativity are higher than Oman study which shows 0.7% negativity (Diyab et al.2018) and Sabians (Mandaeans) Iraq which shows 3.8% negativity (Alia et al.2014). our study is similar to Egyptian study which showed 14.4 % negativity (Swelem et al, 2018) and Karbla study (Iraq) which showed 17.7% negativity (Alanazi et al, 2013) . In international countries the negativity varies from country to other. In Turkey, it was 14% (Dilek et al,

2006), in Pakistan, it was 10.9 % (Hammed et al,2006) and in India, it was 2.7% (Sidhu et al,2003). The variation in frequency of Rh phenotypes is due to difference in racial and geographical differences as well as migration move.

Data related to ABO blood groups revealed that the higher frequency was of O blood group was (51.8 %), followed by A blood group (24.2%), then B blood group (16.2%) and lastly AB blood group (7.8%). These results, in keeping with other studies in Saudi Arabia, suggest that blood group AB is the least dominant while O is the most dominant. (amal et al, 2019; Elsyied et al, 2015)

Rh hemolytic disease of the fetus and newborn (HDFN) is a condition in which transplacental passage of immune maternal antibodies results in immune hemolysis of fetal / neonatal red cells. The immune antibodies develop following a sensitizing event like transfusion or pregnancy. The hemolytic process may result in anemia or hyperbilirubinemia or both; thereby affecting fetal / neonatal morbidity and mortality. This can be prevented by the administration of anti-D. In our study about 28% of the Rh-negative women not taking anti-D injections. This may explain the higher percentage of Rh HDN

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in our study which constitutes 37.9 %. As 11 out of 30 babies of Rh negative women developed Rh HDN. This is in accordance with a study done in Jeddah which reported that 23.6% of Rh negative women had antibody titer in their blood (Bondagji, 2011). In contrast, Alkhotani et al 2014, reported a 2.6% of neonates with indirect hyperbilirubinemia had Rh HDN. The Rh HDN in developing countries is still higher than developed countries due to the inadequate prenatal care or failure to administer Rh IG (Irshad et al, 2011 and Bennardello et al,2013)

CONCLUSION:

The Rh-negative phenotype in the Makkah city was found in 14.6% of our study and it is more frequent in females than males. The Rh hemolytic disease of the newborn comprises 37.9%. Full Rh phenotypes antigens should be done in all pregnant women and their husband to avoid the Rh hemolytic disease of the newborn.

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