RH AND KELL PHENOTYPING- A CLOSER LOOK

Dr. Jhalak Patel, Dr. Vishvas Amin, Ms.Palak Panchal, Ms.Jyoti Shetty, Mr.Emmauel Christian,
Mr. Bharat Parmar, Mr. Akib Mansuri

Indian Red Cross Society, Ahmedabad District Branch

INTRODUCTION

There are currently 47 recognized blood group systems containing 366 red cell antigens (October 2024).[1] The Rh blood group system has 56 antigens, out of them 5 antigens D, C, c, E, and e are clinically significant antigens. The Kell blood group system has 25 highly immunogenic antigens. Cases have been reported where IgG-type of antibodies against Rh and Kell antigens are found which are responsible for transfusion reactions and hemolytic disease of newborn.

AIMS & OBJECTIVES

This study tries to highlight the frequency of Rh and Kell antigens among the blood donors and patients from a period of April to June 2024 and to provide Rh and Kell antigen-matched blood products to patients to prevent alloimmunization.

MATERIALS & METHODS

The antigen typing for Rh antigens (D, C, c, E, and e) and Kell (K) is performed by Erythrocyte Magnetic Technique using a microplate (DuoLys) in a fully automated immunohematology system - Diagast Qwalys Evo by France.

RESULTS

A total of 22,024 samples were processed of which the most common ABO group was “B” followed by “O”. “AB” was least reported ABO blood group amongst our donor and patient population. (Table-1) The frequency of “D” antigen was 93.07% (*n* = 20,498), “C” was 87.31% (*n* = 19,231), “c” was 59.09% (*n* = 13,013), “E” was 16.94% (*n* = 3,731), “e” was 98.98% (*n* = 21,800), and “K” was 1.72% (*n* = 381). (Table-2) The most common Rh phenotype observed in our study is R1R1 (DCe/DCe) followed by R1r (Dce/dce). (Table-3).

Table-1 ABO and Rh Frequency

SN	ABO /RH	count	%
1	A	5082	23.07
2	B	7685	34.89
3	AB	2034	9.24
4	O	7223	32.80
5	RH Positive	20498	93.07
6	RH Negative	1526	6.93

Table-2 Rh and Kell Frequency

SN	Rh /Kell	count	%
1	C Positive	19231	87.31
2	c Positive	13013	59.09
3	E Positive	3731	16.94
4	e Positive	21800	98.98
5	Kell Negative	21643	98.27
6	Kell Positive	381	1.73

DISCUSSION

The most common Rh antigen in our study was e antigen which was 98% which was similar to studies done by Gajjar *et al* & Makroo *et al*.[2,3] The knowledge of the frequency of various blood group antigens and phenotype in the local population is necessary to understand the probability and hence to find out compatible blood unit for patients. Antigen frequency plays a key role in calculating the number of units to be crossmatched.

Table -3 Rh Phenotypes Frequency

SN.	Rh Phenotypes	Count	%
1	DCe/DCe (R1R1)	8991	40.82
2	DCe/dce (R1r)	7527	34.18
3	DCe/DcE (R1R2)	2600	11.81
4	DcE/DcE (R2R2)	221	1.00
5	Dce/dce (R0r)	265	1.20
6	DcE/dce (R2r)	872	3.96
7	DcE/dCE (R2ry)	3	0.01
8	DCe/dCE (R1ry)	19	0.09
9	dce/dce (rr	1419	6.44
10	dCe/dce (r0 r)	90	0.41
11	dce/dcE (rr00	16	0.07
12	dCe/dCe (r0 r0)	1	0.00

CONCLUSION

Alloimmunization is a significant complication for patients who require multiple or chronic RBC transfusions, transfusion of at least Rh and Kell phenotyped matched donor red cells can lead to a great decrease in the risk of alloimmunization and adverse events related to transfusion.

REFERENCES

1.https://www.isbtweb.org/isbt-working parties/rcibgt.html
2. Gajjar M, Patel T, Bhatnagar N, Patel K, Shah M, Prajapati A. Partial phenotyping in voluntary blood donors of Gujarat State. Asian J Transfus Sci. 2016;10:67–70. doi: 10.4103/0973-6247.165836.
3. Makroo RN, Bhatia A, Gupta R, Phillip J. Prevalence of Rh, Duffy, Kell, Kidd and MNSs blood group antigens in the Indian blood donor population. Indian J Med Res. 2013;137:521–6.