Prevalence of C, c, E, e, K, and k antigens in RhD-negative blood donors in and around Puducherry

Rh blood group system with its gene located on Chromosome 1p36.11 is the second-most important blood group system next to ABO. At present, 55 antigens have been identified in the Rh system.[1] However, the most important antigen is the D antigen, followed by E, c, C e, which can cause HTR and HDFN.[2] The prevalence of these antigens is determined by ethnicity and geographical distribution.[3] The Kell blood group system with its gene located on chromosome 7q33 has 36 antigens, of which K antigen is the most immunogenic after correction for transfusion exposures.[1,2]

In this report, we tried to analyze the distribution of clinically significant blood group antigen for Rh (C, c, E, e) and Kell (K, k) in Rh (D), negative donors, at a tertiary level care hospital in Southern India. Rh D typing was performed on 30,971 donors over 22 months, from September 2014 to June 2016. One thousand nine hundred and sixty six of them tested to be Rh D negative (6.3%). Of these RhD-negative donors, we chose only first-time donors to avoid duplication, i.e., 596 (30.3%). The column agglutination technique was used to phenotype C, c, E, e, K antigens with ID Card, "DiaClon Rh-subgroups antisera" and "DiaClon Kell group antisera" from Diamed AG, Switzerland.

The positivity for the antigens was C = 30 (5%), c = 594 (99.67%), E = 6 (1%), e = 594 (99.67%), K = 594 (99.7%), and k = 595 (99.8%), the results of the predicted genotypes are depicted in Table 1.

The prevalence of Rh(D) negative in India ranges from 5% tp 10%.[4,5] Rh and Kell systems are the next most immunogenic after ABO. However, after searching the literature, we could not find any study, which had done phenotyping for Rh(C, c, E, e) and Kell(K, k), exclusively among Rh(D)-negative donors. Our study is comparable with a study conducted by Thakral *et al*., which showed that Rh(C) was positive in 8.54% of Rh(D)-negative donors. They did phenotyping for Rh(C, c, E, e) and Kell(K, k) systems in 1240 voluntary "O" blood group donors, which included only 82 Rh(D)-negative donors.[6] The prevalence of all the other Rh antigens agreed with the prevalence that we obtained. Rh(E) antigen prevalence is very low in Rh(D)-negative donors with 1.01% (6 out of 596) in our study. A study done by Kahar and Patel showed a prevalence of 16.67%, and a study by Gundrajukuppam *et al*. showed 8.47%, which is higher.[7,8] In both studies, the sample size was very less with 18 and 59 of Rh(D)-negative donors in their study, which may be the limitation.

Table 1: Predicted genotypes and their prevalence in the tested population

Predicted Fisher's race genotyping	Weiner typing	Number of donors	Prevalence (*n*=596) (%)
dce/dce	rr	560	93.96
dCe/dce	r'r	28	4.69
dCe/dCe	r'r'	2	0.34
dcE/dce	r"r	4	0.67
dcE/dcE	r"r"	2	0.34

Our present study highlights the prevalence of Kell(K) antigen as 0.34% of Rh(D)-negative donors, as expected from other studies. Kell(k) cellano is again a high prevalence antigen, and it is usually present in almost 100% of individuals. The same holds good in our study, with 99.83% (595 out of 596) donors turning to be positive for Kell(k) antigen in Rh(D)-negative donors.[3,6]

The importance of our study on phenotyping Rh and Kell, especially in Rh(D)-negative donors, is that usually, Rh(D)-negative donors are eligible for transfusion to ABO-compatible Rh(D) positive donors, whereas the reverse is not. Attempts at having a rare donor registry have been started in our country, which should pave the way for a leap in providing them to needy patients.

Financial support and sponsorship

Intramurally funded by JIPMER.

Conflicts of interest

There are no conflicts of interest.

Sridhar Gopal, Rajendra Kulkarni, Abhishekh Basavarajegowda

Department of Transfusion Medicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, India

Address for correspondence:
Dr. Abhishekh Basavarajegowda,
Department of Transfusion Medicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Room No 5042, Superspeciality Block, Puducherry, India.
E-mail: drabhigowda@gmail.com

Submitted: 09-07-2021
Revised: 20-09-2021
Accepted: 10-10-2021
Published: 26-05-2022

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Access this article online	
Website: www.ajts.org	**Quick Response Code:**
DOI: 10.4103/ajts.AJTS_94_21	

How to cite this article: Gopal S, Kulkarni R, Basavarajegowda A. Prevalence of C, c, E, e, K, and k antigens in RhD-negative blood donors in and around Puducherry. Asian J Transfus Sci 2022;16:150-1.