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Original Article

PREVALENCE OF KELL BLOOD GROUP SYSTEM IN BLOOD DONORS ATTENDING A TERTIARY CARE CENTRE IN NORTHWESTERN INDIA

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ABSTRACT

Objective: The Kell blood group system is amongst one of the clinically significant blood group system in blood transfusion, consisting of different types of antigens with high immunogenicity which can be a potential cause of serious transfusion reactions and hemolytic disease of fetus and newborn. Knowledge of the antigenic frequency is crucial to assess the risk of alloimmunisation and to guide the probability of finding antigen-negative donor blood, which can be useful for a patient with corresponding or multiple red cell alloantibodies.

Methods: This is a retrospective study which was done at Department of Immunohematology and Transfusion medicine, SMS Medical College, Jaipur over a period of one year from 1st Jan to 31st Dec 2020. During the study period, blood both voluntary donors as well as replacement donors were typed for Kell antigens by automated red cell antigen typing by capture-R technology in neo immucor.

Results: A Total of 9677(Nine Thousand Six Hundred Seventy Seven) Blood donors were typed for Kell Antigens. Out of these 9677 samples, 288 were Positive for Kell positive (K+) resulting in overall frequency of Kell (K) Antigen as 2.9%.

Conclusion: This is the first study that set out to determine the prevalence of Kell antigens among Blood Donors in Northwestern India. These results appear to be useful in providing better care for patients by implementing tests that should become a routine in blood banks. The Kell system is very important in Transfusion medicine practice.

Keywords: Blood, Care centre in Northwestern India

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INTRODUCTION

The blood transfusion services aim to ensure adequate and safe blood to minimize the development of transfusion-transmitted infections and transfusion reactions. The concept of safe blood started with the discovery of the ABO blood group in 1901 and Rh blood group in 1939-1940 [1]. The Kell blood group system was discovered in 1946. The Kell blood group system is the second most important protein blood group system in transfusion medicine after Rh, because the antibodies can cause HTRs and HDFN. It was the first blood group system discovered after the introduction of antiglobulin testing [2]. There are 36 antigens in Kell blood group system. Kell blood group antigens are present only on RBCs. The Kell antigen is much less common but very immunogenic. Because of this, Anti K is often encountered. Anti-Kell antibodies are lethal and can cause alloimmunization, especially in patients who required multiple-transfusion in hematologic disorders and malignancies [3]. Phenotypic profiling helps us to know the distribution of antigens in a particular population. In present study, our aim is to determine the distribution of Kell antigens in blood donors to generate the blood bank database and to compare the results with others groups/population [4].

MATERIALS AND METHODS

This is a retrospective study which was done at IHTM department, SMS Medical College, Jaipur over a period of one year from 1st January 2020 to 31th December 2020. A total of 9677 Voluntary Donors and Replacement Donors were phenotyped for ABO, Rh and Kell antigens on a fully automated system immunohematology analyzer Galileo that uses the microplate haemagglutination technique for typing with IgM monoclonal antiserum and Capture-R Select (SPRCA-Solid Phase Red Cell Adherence) for typing with polyclonal IgG antiserum. The mechanism and data processing of Galileo is software-driven.

RESULTS

Study included a total of 9677 donors. Nearly 36.7% of donors were B blood group followed by O blood group (33.4%), A blood group (21.7%), and AB blood group (8.2%) [Table 1]. D antigen was present in 93.5% (9049) donors and absent in 6.5% (628) of donors [table 1]. Kell antigen is present in 288(2.9%) of the blood donors of our study population, whereas 97.1% of the donor population is Kell negative [table 2 and fig. 1].

ABO and Rh blood group typing were also done along with Kell antigen and prevalence of Kell blood group was found to be similar in various blood groups with no statistical significance i. e. 2.97% in O Blood group, 4% in A Blood group, 2.5% in B Blood group and 3.02% in AB Blood group [table 3 and fig. 2].

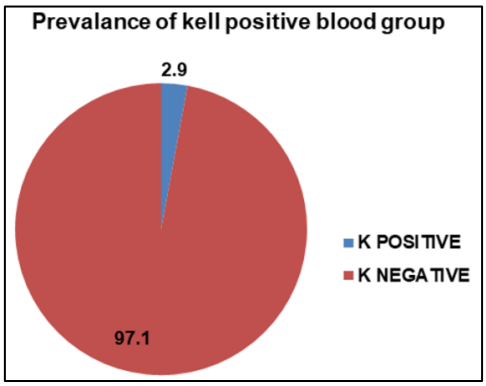

Fig. 1: Prevalence of kell blood group in the blood donors in the population

Table 1: Abo blood donors

Blood group	Number of donors Rh-D positive, n(%)	Number of donors Rh-D negative, n(%)	Total n(%)
A	1924 (19.9%)	174 (1.8%)	2098 (21.7 %)
B	3354 (34.6%)	202 (2.1%)	3556 (36.7%)
O	3037 (31.4%)	193 (2%)	3230 (33.4 %)
AB	734 (7.6%)	59 (0.6%)	793 (8.2%)
Total	9049 (93.5%)	628 (6.5%)	9677 (100%)

Table 2: K antigen in donors

Antigen	Number of donors	%
K positive	288	2.9
K Negative	9389	97.1
Total	9677	100

Table 3: Frequency of kell positivity in abo blood group

Blood group	A (n=2098), n(%)	B(n=3556), n(%)	O(n=3230),n(%)	AB(n=793), n(%)
K positive (n=288)	84 (4%)	87 (2.5%)	93 (2.97%)	24 (3.02%)
K Negative (n=9389)	2014(96%)	3469 (97.5%)	3137 (97.03%)	769 (96.9%)

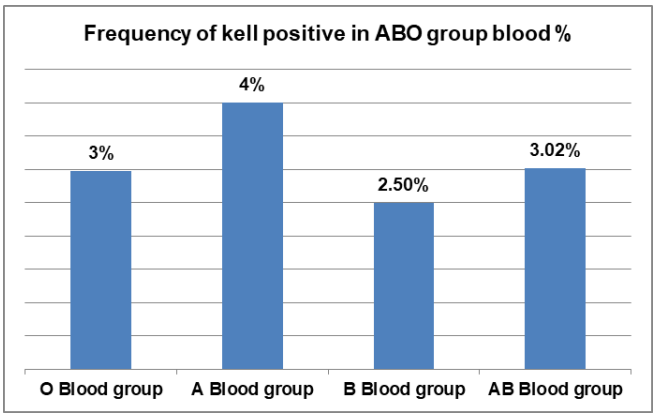

Fig. 2: Showing frequency of kell positivity in ABO blood group

Table 4: Comparison of kell antigen among different studies

Antigen	Present study (n=9677) (%)	Kahar MA *et al.* [8] (n=115) (%)	Agarwal N *et al.* [5] n=9280 (%)	Thakral B *et al.* [7] (n=1240)(%)	Gargand Singh *et al.* [4] (n=2769) (%)	Whites [4, 5, 7, 8](%)	Blacks [5] (%)
K+	2.9	6.09	1.97	5.68	1.60	8.80	2
K-	97.1	93.9	98.03	94.32	98.40	91.2	98

DISCUSSION

In the present study, The ABO blood group antigens frequencies showed the prevalence as B>O>A>AB. Studies conduct by Agarwal *et al.*,[5]Chandra and Gupta, [6] Gundrajukuppam *et al.* [7] also followed the same trend. In Kell blood group system Kell antigen was found positive in 2.9% blood donors and Kell antigen negative in 97.1% in our study. When we compare our study with other studies i. e. Agarwal N *et al.*, [5] shows the frequency of 1.97% of K positive antigen and 98.03% of K negative antigen and among black population K antigen positive in 2% and negative in 98%, [5] and Garg and Singh *et al.*, [4] shows 1.60% Kell positivity but our study results are lower than the studies conducted by Kahar MA *et al.* [8], which shows the frequency of 6.09 % of k positive antigen and 93.91% of K negative antigen and studies conducted by Thakral *et al.*, [9] which shows the frequency of 5.68%, and in whites, the frequency of K positive was 8.80% and K negative was 91.2% (table 4).

CONCLUSION

Knowledge of red cell antigen frequencies in a population is helpful to create donor database for preparation of indigenous cell panels and providing antigen-negative compatible blood to patients with multiple allo-antibodies and also reduce the risk of RBC antigen alloimmunization along with their complications like HTRs and HDFN. Thus it is suggested that extended blood typing, including Kell Antigen be implemented for multi-transfused patient. This strategy would be another step forward in improving the safety of blood transfusion.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally

CONFLICTS OF INTERESTS

Declared none

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