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Research Article

RED CELL ALLOIMMUNIZATION IN CHRONIC KIDNEY DISEASE PATIENTS

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A B S T R A C T

Background: There is a high incidence of alloimunization in many patients with diseases that require repetitive blood transfusions. One such group is chronic renal failure patients as majority of them have severe anemia due to deficiency of erythropoietin. As many such patients are unable to afford erythropoietin, they are treated with blood transfusions. This study was thus undertaken to study alloimunization in such patients at our center.
Methods: A total of 155 patients found eligible were enrolled in this cross-sectional study that was carried out from April 2018 to November 2018. After detailed history, antibody screening was done by using a commercial two cell panel of the SPRCAT (Capture, Immunor Inc. Norcross, GA). All cases where antibody screen test was positive were subjected to antibody identification. These positive samples were investigated to identify thedetected antibodies using commercial 16 cell panel of SPRCAas and when required.
Results: 155 patients including 82 male and 73 female patients. Alloantibodies were detected in a total of 2 patients (1.29%). Both the patients having multiple antibodies.On alloantibody type identification, the most common type found was anti C and Duffy B (2/4) each. Prevalence of alloimmunization in both the sex is about 50-50 %
Conclusions: Alloimmunization to minor erythrocyte antigens occurs in many patients of chronic kidney disease patients. This results in frequent pre-and post-transfusion complications. Inclusion of antibody screening test in routine pretransfusion testing protocol for the patients who are at higher risk of alloimmunization and require long-term transfusion dependence is desirable.

INTRODUCTION

Blood transfusion, although life-saving, is associated with inherent risks of alloimmunization to various red cells, leukocytes or platelet antigens. Red blood cell (RBC) alloimmunization occurs due to genetic disparity between donor and recipient antigens.[1]There is a high incidence of alloimunization in many patients with diseases that require repetitive blood transfusions. One such group is chronic renal failure patients.

The frequency of alloimmunization is extremely variable depending on the patients or donors being studied. Healthy blood donors have very low immunization rates. In chronically transfused patient populations, such as those with Thalassemia or sickle cell anemia, Patients with oncological disease , Chronic kidney disease, Multiparous females as many as 2% to 40% of individuals are -reported to be alloimmunized. [2-4]
Anemia is a severe complication of chronic kidney disease (CKD) that is common in more than 80 %of patients with impaired renal function [5,6].Although there are many mechanisms involved in the pathogenesis of anemia (iron, folate, or vitamin B12 deficiency; gastrointestinal bleeding; severe hyperparathyroidism; systemic inflammation; and shortened red blood cell survival), the primary cause is the inadequate production of erythropoietin by the damaged kidneys.

These patients are usually anemic and unable to produce adequate amounts of red blood cells following blood loss [7,8].Therefore, red cell transfusions are often required during the course of the disease in order to maintain adequate hemoglobin levels.

Various studies in the past have demonstrated the presence of alloantibodies in multi transfused patients chronic renal disease patients. The reports have demonstrated varying percentages in different population groups and different diseases.[10-13] Keeping in view this disparity this study was planned and conducted to identify alloantibodies in patients of chronic renal failure undergoing dialysis at a tertiary care center in WESTERN India.

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METHODOLOGY

This study was conducted in theDepartment of Immuno Haematology and Transfusion Medicine, Sardar Patel Medical College and A.G. Hospitals, Bikaner, Rajasthan from April 2018 to November 2018. Patients receiving repeat multiple transfusions with diagnosis of End stage renal failure patients whose follow up and regular antibody screen test was possible, were included in the study.

Each time a blood requisition for these patients was received, a sample for antibody screen testing, 3 to 4 ml in Ethylene Diamine Tetraacetic Acid (EDTA) tube, was requested as a protocol. Only exception was where second transfusion was scheduled within 72 hours of the previous transfusion in such cases, repeat antibody screen testing was omitted.

Patient's plasma was then screened for the presence of any red cell antibodies on a commercial two cell panel of the SPRCAT (Capture, Immunor Inc. Norcross, GA). All cases where antibody screen test was positive were subjected to antibody identification. All cases who were positive with two cell panel further screen with three cell panel of SPRCAT (Solid phase red cell adherence technique Capture, Immunor Inc. Norcross, GA).These positive samples were investigated to identify the detected antibodies using commercial 16 cell panel of SPRCA (Capture, Immucor Inc. Norcross, GA) as and when required. The criteria for antibody specificity were based on the recommendations of AABB.[9] Once a sample was found positive by antibody screen test and antibody further typed by antibody identification.

RESULT

A total of 155 patients were included in the study and screened for the presence of any antibodies. This included 82 males and 73 female patients. The patients were between 11 to 82 years of age with a mean age of 48.5 years. Alloantibodies were detected in 2 out of 155 patients i.e. 1.29% of total patients (Figure 1). The mean age of patients with alloantibodies was 54.5years. There were 1 males and 1 female patients with alloantibodies. Both the patients who were alloimmunized had multiple antibody Thus, a total of 4 alloantibodies were found in 2 out of a total of 155 patients. The details of patients with alloimunization is depicted in Table 1. On alloantibody type identification, the most common type found was anti C and Duffy B (2/4) each. Prevalence of alloimmunization in both the sex is about 50-50 % .

Table 1 Demographic data of chronic renal failure patients who received regular blood transfusion (N=155)

Diagnosis	Gender		Total
Chronic kidney diseasse	Male	Female	
	82(53%)	73(47%)	155(100%)

There were about 53% male and 47 % female who participated in this study. Total patients were 155.

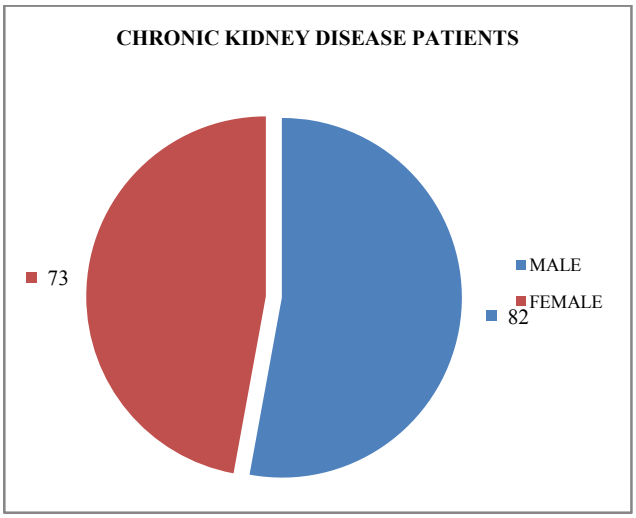

Table 2 Chart representing details of alloimmunized Patients.

S.No.	Name	Age	Sex	Blood group	3 cell panel result	Alloantibody
1	Shivratan	49Y	M	B+	0,0,1	C, Duffy B
2	Bhatari	60Y	F	O+	0,0,2	C, Duffy B

DISCUSSION

Red cell alloimmunization occurs in a variable number of multiply transfused patients. In such condition, transfusion therapy may become significantly complicated. Due to alloimmunization may include difficulty in finding compatible RBC units because of the presence of clinically significant RBC antibodies, transfusion reactions, or platelet refractoriness.[13] Present study is an effort to characterize blood group alloantibody formation in the patient population as only a few studies, mostly in non-Asian multiply transfused patients.

Incidence of Alloantibodies in Multiply Transfused Chronic Renal Failure Patients

In present study red cell alloimmunization rate was found to be 1.29% in chronic kidney disease patients. Habibi and Lecolier[14] reported the incidence of red cell alloimmunization to be 1.72% in multi-transfused patients for hemodialysis.

In a study by Domen and Ramirez *et al*,[15] incidence of alloimmunization in chronic renal disease patients on hemodialysis was found to be 6.1%
Shukla and Chaudhary*et al*,[16] published a study where in they investigated the frequency of red cell alloimmunization in multi-transfused chronic renal failure patients undergoing hemodialysis. An alloimmunization rate of 9.8% was observed.

Previous studies reporting low rate of alloimmunization (5 to 10%) include those by Chaudhary*et al*,[16] Blumberg *et al*,[17] and Hmida*et al*.[18] A high rate of approximately 20% was noted in studies by Spanos*et al*, [19] Singer *et al*, [20] and Ameen *et al*.[21]

There is some disparity in the reported incidence of alloimunization in chronic renal disease patients receiving multiple transfusions. While the rate of alloimmunization in such patients was as high as 14% in the study of Blumberg *et al*, on the other hand Agarwal *et al* in their study in 2016 could not identify alloantibody even in a single patient out of a total

47 such patients included in their study. [22,23] Therefore it is desirable to conduct more such studies in different population groups and identify the frequency and type of alloantibodies in multitrans fused patients specific to that area.

CONCLUSION

The incidence of alloimmunization depends on the demography and the population being studied. Such characteristics as age, sex, the type of hospital and the population being studied made it difficult to relate the experience of one institution to another.

Our data showed low alloimmunization rate in multiple transfused chronic renal failure patients. The factors that might contribute to this finding were the similarity of patients and donors ethnicity.

However, even though the immunization rate was low, we still recommend routine RBC antigen phenotyping for all multiple transfused chronic renal failure patients before starting RBC transfusion and providing pre storage leucodepleted blood matched for ABO and Rhesus antigen.

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