

ABO and Rhesus Phenotype Frequencies in Multi-Transfuse Hemodialysis Renal Patient and Blood Donor in Central Sudan

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ABSTRACT

Objective: Blood transfusions are commonly used in the management of patients with chronic renal failure (CRF) undergoing hemodialysis for dialysis-related anemia. Accordingly, they are intended to alloimmunization due to repeated transfusions. Therefore, the purpose of this study was designed to identify the distribution patterns of ABO blood group and Rh-D, C, c, E, e antigen to provide first step donor data bank to prepare red blood cell panel to minimize rhesus alloimmunization among the hemodialysis patients and blood donors at renal dialysis center, Khartoum and Wad Madani, Sudan from December 2016 to December 2017.

Methods: Samples from 351 blood donors and recipients were serologically tested for ABO, Rh (D, C, E, c, and e) using slide and tube method. ABO and Rh Phenotypes' frequencies were calculated as a percentage.

Results: The ABO blood grouping showing a typical frequency O >A>B>AB and also the frequency of rhesus antigen showing D >c>e>C>E in both male and female renal failure patients.

Conclusion: Blood donors need special precautions to minimize any possible alloimmunization by such antigen.

Keywords: Blood Grouping; Rh Typing; Blood Donor; Chronic Kidney Failure.

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INTRODUCTION

The prevalence of chronic kidney diseases (CKD) has increased in recent decades globally¹ due to various reasons such as accumulated stress due to lifestyle modification², excessive intake of animal proteins³, and severe dehydration.⁴ Regular blood transfusion is essential in patients with Chronic renal diseases and blood transfusion usually practiced in the dialysis unit. However, blood transfusion therapy became complicated due to the development of erythrocyte alloantibodies.⁵ Therefore, individual patient immune status is also an important factor in the development of alloantibodies especially when blood transfused between genetically varying from donor to recipient.⁶⁻⁸ The safety measure of blood transfusion is a core objective of transfusion medicine since alloimmunization is an immune response developed against foreign RBC antigens after transfusion.⁴ However, the frequencies of ABO, Rh antigens (D, C, E, c, e), in hemodialysis renal failure were not published much before.

Thus, the study was performed to determine the frequencies of ABO and Rh antigens, among hemodialysis renal failure patients in central Sudan to be safe in transfusion medicine.

MATERIALS AND METHODS

Ethical Consideration

This study was conducted in accordance with the ethical standards within the political borders of Sudan. All the participants involved in this study have read, understood, and signed a written consent form. This study was approved by the ethical committee of the University of Gezira. During the distribution of the questionnaire, participants were informed that the information collected would be kept anonymous and participation was totally voluntary. Cross-sectional study design was performed at the renal dialysis center, Khartoum and Wad Madani, Sudan from December 2016 to December 2017. A total of 301 patients among

them 239 males and 62 females of various age group were diagnosed as a chronic renal failure who had received ABO blood from the donors.

In this study, 50 male individuals of different age group were donated blood and designated as donor control. Clinical and transfusion records of all the patients were written and maintained throughout the study.

Sample Collection

5 ml of venous blood was collected from each patient using vacutainer EDTA tubes and stored at 4°C for further experimental work.

Laboratory Investigation

The determination of ABO blood group and Rh (D) blood group was done according to the principle of slide method.⁹ A drop of

blood from each volunteer was placed on a glass slide in three places. A drop of each of the antisera A, B and D was added by using a dropper and mixed with each blood sample, with the aid of glass rods. Then, the mixture was rocked gently for 60 s to observe for agglutination. The results of agglutination were recorded immediately after mixing. However, the doubtful result has been checked under a microscope by using the 10× objective lens. The test was also performed for positive control to determine the potency and negative control to detect the purity of antisera. The Rh phenotyping was analyzed by capillary – tube method.^{9,10}

Statistical Analysis

The statistical analyses were performed by Microsoft Office Excel 2007, MS Office, USA, and the result was calculated as the percentage frequency of each blood group

Table 1: Distribution of ABO blood group in chronic renal failure and blood donor in term of gender

Sex	Blood group				Total
	A	B	AB	O	
Male	89	55	15	130	289
Female	23	10	4	25	62
Total	112	65	19	155	351

Table 2: Frequency of rhesus phenotype in multi transfuse chronic renal failure patient and blood donor

Rhesus phenotype		Blood donor	Patient	Total (Patient and donor)
		n (%)	n (%)	n (%)
C	Positive	17(34%)	93(30.9%)	110(31.3%)
	Negative	33(66%)	208(69%)	241(68.7%)
C	Positive	39(78%)	234(77.7%)	273(77.8%)
	Negative	11(22%)	67(22.3%)	78(22.2%)
D	Positive	45(90%)	263(87.4%)	308(87.8%)
	Negative	5(10%)	38(12.6%)	43(12.2%)
E	Positive	11(22%)	66(21.9%)	77(21.9%)
	Negative	39(78%)	235(78.1%)	274(78.1%)
e	Positive	34(68%)	196(65.1%)	230(65.5%)
	Negative	16(32%)	105(34.9%)	121(34.5%)

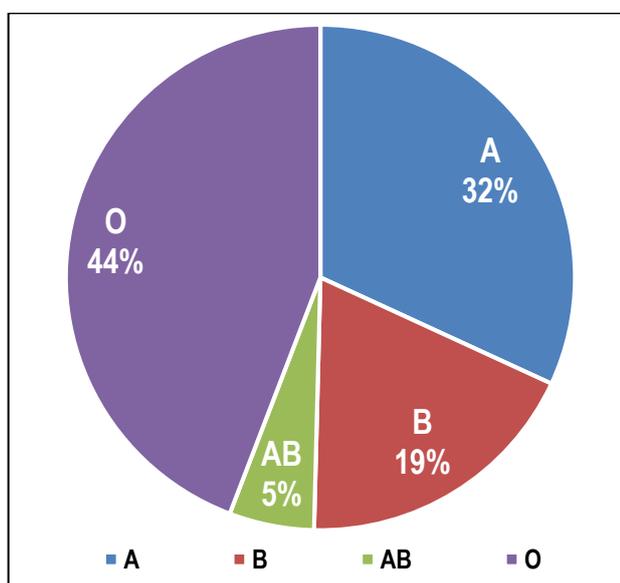


Figure 1: Frequency of ABO in multi-transfuse chronic renal failure and blood donor

RESULTS

In this study, among screened ABO blood grouping for chronic renal failure patients and blood donors was tabulated in table 1. It is very obvious that 82.3% was male participants and 17.6% of female participants. ABO blood grouping data revealed that group O was predominant in both male and female followed by group A, group B, and group AB. Figure 1 shows the % distribution of ABO blood groups among the total participants (for both male and female). The frequency of rhesus phenotype in multi transfuses chronic renal failure patient and blood donor is shown in table 2. The Rhesus- negative phenotype distribution is more for group E, 78.1 % that includes both male and female. Group C constitutes 68.7%. In the rhesus-positive phenotype distribution, rhesus D antigen has a percentage frequency of 87.8%; rhesus antigen 77.8%; rhesus antigen 65.5%.

DISCUSSION

Recurrent blood transfusion in chronic renal failure patients is an important cause of alloantibodies development due to repeated

exposure of RBC during a transfusion.¹¹ Thus, RBC alloimmunization results from the disproportion of Rh antigens between donor and recipient. The prevalence of alloimmunization is highly influenced by the immune power of recipient, a dose of Rh antigen that can develop as immunogenicity of Rh antigen.¹² Moreover, the formation of RBC alloantibody complicates safer transfusion therapy. Several studies had been suggested the frequency and rate of alloimmunization in patients with different chronic diseases.^{13,14} This study was undertaken to determine the frequency of ABO blood grouping in chronic renal failure patients and blood donor as a prime step to prevent alloimmunization for the safety of patients. In this study, O is the predominant group followed by group A, group B and group AB in either sex of patients. However, it is very interesting to note that the donor blood group also showed a similar kind of frequency from group O to AB. Tamima Al-Dughaishi et al.,²⁰¹⁵¹⁵ conducted alloimmunization study in Rh positive Pregnant woman in Oman. The study was showing that the most common blood group was O followed by A, B, and AB. In Egypt 2018, Omnia Swelem et al.,¹⁶ reported that the frequency distribution of ABO blood grouping was A> O> B> AB. Different researchers published their findings that the prevalence of ABO blood groups was O>B>A>AB. This study showed that the distribution of rhesus phenotyping among the patients is D positive (87.8%), c positive (77.8%), e positive (65.5%), C positive (31.3%) and E positive (21.9%). In our study the frequency of rhesus phenotyping of blood donor and recipient kidney failure patients were similar. The study demonstrated that the frequency of Rh antigens was observed in the sequences of Rh phenotyping D >c>e>C>E in both male and female. Rh E and C antigens are less frequency in both renal failure patients and blood donor. Therefore, it is mandatory to screen the blood Rh antigen factor before blood transfusion for the patients having Rh E and C antigens to minimize the possible alloimmunization.

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