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PRE AND POST BLOOD TRANSFUSION DISTRIBUTION OF RHESUS C AND E AMONG RECIPIENTS OF BLOOD IN AWKA AND ASABA, NIGERIA.

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ABSTRACT

Rhesus c and e red cell antigens are among the highly immunogenic Rhesus antigens after Rhesus D. This study was designed to determine the Rhesus c/e transfusion outcome among recipients of blood transfusion. 71 intending blood recipients were recruited consecutively for the study. The tube agglutination reactions between monoclonal Anti-c and Anti-e reagents and 3% red cell suspension of the participants was used to identify Rhesus c/e antigen on the red cells. The result showed that Out of the 71 intending blood recipients 42(59%) had Rhesus c+/e+; 26(36.6%) had Rhesus c-/e- status; 1(1.4%) had Rhesus c+/e- status and 2(2.8%) had Rhesus c-/e+ status. Amongst the recipient post-blood transfusion 52(73.3%) had Rhesus c+/e+ status; 18(25.4%) had Rhesus c+/e- status; 1(1.4%) had Rhesus c-/e+ status and none had Rhesus c-/e+ status. Post- Blood transfusion 14(20%) of the recipients had a change in Rhesus status from Rhesus c-/e- to Rhesus c+/e+; 1(1.4%) of the recipients had a change from Rhesus c-/e- to Rhesus e-/c+ while 2(2.8%) of the recipients had their Rhesus c-/e+ changed to Rhesus c+/e+ and 1(1.4%) of the recipients had Rhesus c+/e- changed to Rhesus c+/e+. The finding is suggestive that Rhesus c/e antigens should be screened as part of compatibility test before blood transfusion. The addition of Rhesus c/e in the cross match panel in Nigeria may eliminate about 25% post transfusion sensitization.

Keywords: Rhesus antigens, Blood donors, Blood recipients, transfusion, cross-match.

Introduction

People require blood transfusion for several reasons depending on the judgement of the physician based on clinical and medical laboratory diagnostic evidences. Most secondary and Tertiary Healthcare centres in Nigeria provide blood bank services. The predominant blood cell antigens screened before blood is transfused in Nigeria are ABO and Rhesus (D) antigens (Anifowoshe et al; 2017, Okoroiwu et.al; 2015). Once the blood cross match report between the blood of the donor and recipient are declared compatibility based on ABO and Rhesus (D) screening, the blood is cleared for transfusion. Despite the procedures put in place before blood is certified safe for transfusion, incidences of transfusion reactions have been reported in Nigeria (Gwaram et.al; 2012, Nwagu et.al; 2016) and elsewhere (Saha et.al; 2020). Once there is transfusion reactions the blood is discontinued and the clinical presentations of the reactions are monitored and managed. Although it is a well-known fact that numerous Rhesus blood cell antigens exist that are highly immunogenic and possesses the capacity to induce haemolytic transfusion reaction and haemolytic disease of the New-born in pregnant mothers, one wonders while some of this immunogenic Rhesus antigens were not included in cross match panel for blood compatibility testing. Therefore, this study was designed to determine the Rhesus c/e transfusion outcome in blood recipients post transfusion.

Research Method

Seventy one 71 intending blood recipients admitted in the hospital for blood transfusion between the ages of 20 to 45 years were recruited for the study. From each participants Five (5) mls of Blood sample was collected before the commencement of blood transfusion and not later than 72hours after completion of blood transfusion. The blood samples were dispensed into EDTA anticoagulant tube. The cells were washed thrice using phosphate buffered saline and thereafter 3% suspension of red cells in PBS was prepared for each participant. The agglutination tube technique for blood grouping was used to determine the Rhesus antigens c and e status of the participants. The procedure was as described by the manufacturer of the Anti-c and Anti-e (Lorne Laboratories LTD, Great Britain). Into different and properly labelled tubes was added one volume of monoclonal Anti-c or Anti-e and one volume of 3% red cell suspension in PBS was added into each labelled tube. The mixture in the tubes were mixed thoroughly and centrifuged for 20 seconds at 1000rcf. The red cell sediment was gently re-suspended and read macroscopically for agglutination. Presence of agglutination indicates positive Rhesus c and/ or e antigens. The negative samples were incubated for 15 minutes at room temperature (30^{o}C). After which they were centrifuged at 1000 rcf for 20seconds and the sediment gently re-suspended and viewed for agglutination. After this second process any tube with no evidence of agglutination is considered negative for the Rhesus antigen c and e. Negative control was also used as quality control measure.

Presentation of Results

The distribution of the Rhesus c and e antigens amongst recipients before blood transfusion is shown in Table 1. Out of the 71 intending blood recipients 42(59%) had Rhesus c+/e+; 26(36.6%) had Rhesus c-/e- status; 1(1.4%) had Rhesus c+/e- status and 2(2.8%) had Rhesus c-/e+ status.

Similarly the distribution of the Rhesus antigens c and e amongst recipient post-blood transfusion is shown in Table 2. Out of the 71 recipients of blood transfusion, 52(73.3%) had Rhesus c+/e+ status; 18(25.4%) had Rhesus c+/e- status; 1(1.4%) had Rhesus c-/e+ status and none had Rhesus c-/e+ status. Table 3 shows Change in Distribution of Rhesus c and e antigens amongst recipients Post- blood transfusion. fourteen (20%) of the 71 recipients post-blood transfusion had a change in Rhesus status from Rhesus c-/e- to Rhesus c+/e+; 1(1.4%) of the recipients post-blood transfusion had a change from Rhesus c-/e- to Rhesus e-/c+ while 2(2.8%) of the recipients post blood transfusion had their Rhesus c-/e+ changed to Rhesus c+/e+ and 1(1.4%) of the recipients post blood transfusion had Rhesus c+/e- changed to Rhesus c+/e+.

Table 1: Distribution of Rhesus c and e antigens amongst recipients before blood transfusion

Rhesus status	Frequency (%)
Rhesus c+/e+	42 (59%)
Rhesus c+/e-	1(1.4%)
Rhesus c-/e+	2(2.8%)
Rhesus c-/e-	26(36.6%)

Table 2: Distribution of Rhesus c and e antigens amongst recipients post - blood transfusion

Rhesus Status	Frequency (%)
Rhesus c+/e+	52(73.3%)
Rhesus c+/e-	1(1.4%)
Rhesus c-/e+	0(0.0%)
Rhesus c-/e-	18(25.4%)

Table 3: Change in Distribution of Rhesus c and e antigens amongst recipients' Post- blood transfusion

Rhesus status Pre blood transfusion	Change in Rhesus Status post blood transfusion	Frequency (%)
Rhesus c-/e-	Rhesus c+/e+	14(20%)
Rhesus c-/e-	Rhesus e-/c+	1(1.4%)
Rhesus c-/e+	Rhesus c+/e+	2(2.8%)
Rhesus c+/e-	Rhesus c+/e+	1(1.4%)

Discussion of Findings

The present study tried to call for the inclusion of some Rhesus antigens known to be highly immunogenic such as Rhesus c and Rhesus e, into the Rhesus cross match screening panel in Nigeria. The basis for this call was that when Rhesus antigens are mix-matched they are able to induce haemolytic reactions and haemolytic disease of the new born in pregnant women

(Daniels 2002, Hackney et a; 2004, Dean 2005). Till date in Nigeria, the most common cross match screening for blood and blood product transfusion has been ABO and Rhesus D blood group.
In this study about 2/3 of the participants who have been prepared to receive blood transfusion had Rhesus c+ and e+ red cell status. This meant that the distribution of Rhesus c+/e+ to Rhesus c-/e- amongst the recipients before blood transfusion was 3:2. This distribution support the notion that rhesus antigen c and e may co-exist on the red cell in most instances. However, there are instances where only Rhesus c or e may be expressed independently.

In contrast, report elsewhere in Nigeria has shown the prevalence of Rhesus c and e to be higher than that was obtained in this study. The prevalence of Rhesus (c+) blood group was 98.5% in Calabar (Etura et.al; 2020), 100% in Port Harcourt (Serekara et.al; 2021) and 97.7% in Multi-ethnic study in Benin City, Nigeria (Adedoyin et.al; 2018). The distribution of Rhesus (c) red cell antigen varied along ethnic line in Nigeria. Prevalence of Rhesus e and c antigens has been known to vary among ethnic groups (Reid Lonas-Francis 2004).

There were changes in the incidence of Rhesus c/e antigens amongst the recipients post blood transfusion. The incidence of Rhesus c+/e+ was 73.3% post blood transfusion while Rhesus c-/e- was 25.4% amongst the recipients post transfusion. This was a ratio of about 3:1. This was an indication that after the blood transfusion the distribution of Rhesus c/e changed in some cases. This presupposes that some of the recipients of blood transfusion might have been sensitized due to previous transfusion. This finding was seen in most cases with history of multiple blood transfusion.

Recall that the Rhesus D antigen was the only Rhesus antigen being screened during cross matching in the centres where the study was conducted and most centres in Nigeria. The unavailability of Rhesus c and e screening mandate will expose about 40% of the population to Rhesus c/e mix-match during cross matching of blood. Hence blood with Rhesus D+ can be cleared for transfusion to a recipient with Rhesus D+ based on the practice. However if the Rhesus particulars of the blood to be transfused was Rhesus D+/c+/e+ and the recipients particulars was Rhesus D+/c-/e- or Rhesus D+/c-/e+ or Rhesus D+/c+/e- such blood should not be transfused to the recipient. Whenever such blood is transfused sensitization may occur. This is likely the reason for change in Rhesus c and e status of the recipients post blood transfusion.

In this study, a total percentage of the recipients that had changed Rhesus c/e status was 25.6%. This is likely attributable to unavailability of Rhesus c/e reagents and non-indication of these antigens in the Standard operational procedure (SOP) for cross matching in Nigeria. This is suggestive of likely high cases of immune sensitization amongst recipients of blood or blood product transfusion in Awka and Asaba. This also translates into the fact that this number of cases can be avoided if Rhesus c and e antigens are added as part of SOP for cross matching of blood and blood products in Nigeria.

This study is therefore of the opinion that the reports of prevalence of Rhesus c and e in Nigeria may be influenced by the

incidences of sensitization and loss of sensitization due to unavailability of screening for Rhesus c and e before blood and blood products are transfused.
This shift in the number of recipients changing from negative status to positive status could be explained as most likely that this individuals were sensitized due to previous blood transfusion.

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