



Original Research Article

Study of Rhesus Status among Blood Donors in RIMS Hospital, Imphal

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ABSTRACT

The Rh (Rhesus) blood group system is one of the most polymorphic and immunogenic systems known in humans. D antigen is the most immunogenic antigen in the complex Rh blood group system. Because of variability in expression, weaker forms of D antigen are encountered with regards to reactivity with antisera posing problems in blood banking. Weak D defines any D phenotype where D antigen is quantitatively weaker than normal. The importance of weak D lies in the fact that transfusion of weak D red cells to a D negative patient may result in alloimmunization or haemolytic disease of newborn in a sensitized pregnant woman.

The prevalence of Rh(D) negative and weak D varies worldwide. A total of 17,444 samples were tested for Rhesus status in the present study: the percentage of Rh(D) negative was 1.97 (346 cases) and the percentage of weak D was 0.578 among Rh(D) negative and 0.0114 of the total. The aim of the study was to find out the prevalence of Rh(D) negative and weak D among the blood donors of Manipur in North-Eastern India.

Key words: Alloimmunization, D antigen, Rh (D) negative, Weak D.

INTRODUCTION

Rh (Rhesus) is the most important blood group system after ABO in transfusion medicine. The five principal antigens- D, C, c, E and e are clinically significant, of which D is the most immunogenic. It is common in clinical practice to equate D with Rh and to use the terms Rh positive and Rh negative to describe D positive and D negative. The Rh antigens are encoded by two homologous, closely linked genes on the short arm of chromosome 1: RHD producing D antigen

and RHCE producing Cc and Ee antigens. [1] Weak D (formerly known as D^u) defines any D phenotype where the expression of D antigen is quantitatively weaker than normal. It is distinguished from partial D, which defines a D phenotype qualitatively different from normal D. [2] The significance of weak D lies in the fact that transfusion of weak D red blood cells to a D negative patient may result in alloimmunization and subsequent exposure to such red cell can lead to fatal haemolytic reaction or haemolytic disease of newborn in a

sensitized pregnant female. Weak D expression results primarily from single nucleotide mutations in RHD that encode amino acid changes predicted to be located intracellularly, or in the transmembrane regions of RHD, rather than on the outer surface of the red cell. [3] Many different mutations cause weak D expression.

The prevalence of Rh negative phenotype worldwide varies between 3%-25% and rare in Asians (<0.1%) and that of weak D ranges from 0.2% - 1%. [4] The aim of the study is to find out the prevalence of Rh (D) negative and weak D among the blood donors of Manipur, North-Eastern India.

MATERIALS & METHODS

The study was conducted in the Department of Immunohaematology & Blood Transfusion, Regional Institute of Medical Sciences, Imphal, Manipur, India during the period from June 2013 to December 2014. The test population included healthy blood donors having fulfilled the donor criteria laid down by CDSCO, Govt. of India. All samples were tested for ABO and Rh (D) typing by conventional saline tube method using commercially available antisera. Rh typing was done by using two different antisera-IgM monoclonal (Span Clone) and IgM & IgG Blend monoclonal (Tulip Diagnostics). All the samples found negative with anti-D were further investigated for Weak D by Indirect Coombs method (IAT) using anti human globulin (AHG) reagent (Tulip Diagnostics). If there was agglutination, then the sample was labelled as Weak D positive. The validity of every negative test was checked by putting one drop of IgG sensitized O red cells.

RESULTS

During the study period a total of 17,544 donors' blood samples were tested

for Rh (D) status. A total of 346 samples were found to be Rh (D) negative (1.97%) and only two samples out of 346 were found to be weak D positive making a percentage of 0.578. Among the total number of donors the percentage of weak D was 0.0114 (Table 1).

Table 1. Distribution of Rh (D) among donors

Total Sample tested	Rh (D) positive	Rh (D) Negative	Weak D		
			No.	% among Rh(D) negative	% of Total
17544	17198 (98.03%)	346 (1.97%)	2	0.578	0.114%

DISCUSSION

The incidence of RhD negative frequency is variable in different geographic locations. D is a high frequency antigen in East Asia reaching 99.7% in Hong Kong Chinese and Japanese. [5] Between 82 and 88% of Europeans and North American Caucasians are D positive; around 95% Black Americans are D positive. [1] A study in Pakistan has reported 7% D negative among the population. [6] The incidence of RhD negative in the present study is 1.97% as compared to other parts of India like South India-5.42% [7] Lodha tribe in Midnapore district of West Bengal- 0.5%, [8] Northern India-8.7%, [9] greater Gwalior region- 8.9%, [10] 5.2% and 12.6% in Uttarakhand. [11,12] The incidence of weak D antigen ranges from 0.2 – 1% worldwide. One estimate gave frequencies of weak D as 0.3% and 1.7% in White and Black North London donors. [13] The incidence of weak D in the present study is 0.578% among the RhD negative group and 0.0114 % of the total. Other studies in India have reported 0.424% among Rh negative and 0.036% of total in, [10] 0.135% in Dehradun, [12] 0.09% among Rh negative and 0.005% of total in Uttarakhand, [11] and 0.8% among the Pakistani population. [6]

The possibility of alloimmunization in RhD negative person when transfused with weak D positive red cells or haemolytic disease of newborn in a sensitized pregnant female is however debatable. There are not enough cases recorded in the literature to give conclusive evidence. In a study it was found that in child bearing women who expressed weak D antigen, 10.2% institutions transfused D negative blood components while approximately 90% transfused D positive components. [14] The study recommended that obstetric patients who test positive clearly for weak D by AHG (2+ macroscopic agglutination) can be safely regarded as D positive and transfused D positive blood components. Majority of the institutions recommend in transfusion practice to treat weak D positive individuals as RhD positive when they are donors and RhD negative when they are recipients. If a serologic weak D phenotype is detected in a female of child bearing age, the individual is likely to be managed as RhD negative for transfusions and, if pregnant, considered a candidate for RhIG. [15] It is well established that individuals with weak D-1,-2 and -3 make alloanti-D only extremely rarely so it is a reasonable policy to treat patients with those variants as D+, in order to conserve stocks of D negative red cells. [1]

CAP's TMRC (College of American Pathologists Transfusion Medicine Resource Committee) reviewed the current status of RHD genotyping and proposed that selective integration of RHD genotyping in laboratory practices could improve the accuracy of RhD typing results, reduce unnecessary administration of RhIG in women with a serologic weak D phenotype, and decrease unnecessary transfusion of RhD negative blood to recipients with a serologic D phenotype. [15] The Work Group recommends that RHD genotyping be performed whenever a discordant RhD result and / or a serologic weak D phenotype

is detected in patients including pregnant women, newborns and potential transfusion recipients.

CONCLUSION

Molecular and genotyping studies will give more accuracy to resolve discrepancy of weak D and D variants but facilities are not available in many centres. The anti-human globulin test in the detection of weak D is still well accepted. The frequency of Rh (D) negative in our study is 1.97%.The frequency of weak D is 0.578% among the Rh (D) negative group and 0.0114% of the total. More extensive study will be necessary to detect the real chances of D negative persons forming antibody when exposed to weak D positive blood.

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