



## STUDY OF PREVALENCE OF WEAK D ANTIGEN (D<sup>w</sup>) AMONGST SUPPOSED RH NEGATIVE BLOOD DONORS IN A TERTIARY CARE HOSPITAL OF JHARKHAND

### Pathology

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### ABSTRACT

The major antigen of Rh blood group system is the Rh D antigen. The "weak D" actually refers to red cells with the aberrant Rh-D protein expressing reduced membrane surface D antigen. This study was conducted in the Blood Bank of Rajendra Institute of Medical Sciences, Ranchi, Jharkhand. It is a retrospective study and data of 3yrs from January, 2015 to December, 2017 was collected. A total of 1,66,000 healthy blood donors were tested out of which total of 2013 (1.21%) blood donors turned out to be Rh-D negative during a span of 36 months from January, 2015 to December, 2017 and on further testing 7 (0.35%) of them turned out to be weak D positive. For safe blood transfusion & to prevent transfusion related complications, comprehensive national transfusion guidelines need to be laid down to standardize the protocol for D antigen testing for donors as well as patients.

### KEYWORDS

Rh negative, Weak D Antigen, D<sup>w</sup>.

#### I. Introduction

ABO blood group system was discovered by Landsteiner in 1901 followed by which Levine and Stetson discovered Rh antigen in the year 1939<sup>(1)</sup>. Rhesus (Rh) blood group system is one of the most important as well as highly immunogenic and complex with numerous polymorphisms<sup>(2)</sup>. The antibodies against Rh antigen are involved in hemolytic disease of the newborn, transfusion reactions, and hemolytic anaemia<sup>(3)</sup>. 58 Rh antigens have been identified, by the year 2015. The most common and immunogenic are D, C, E, c and e<sup>(4)</sup>. The major antigen of Rh blood group system is the Rh D antigen. The D antigen is encoded by the RH D gene while RhC, RhE, Rhc and Rhe antigens are encoded by RHCE gene<sup>(5)</sup>. Weak D phenotypic expression is known to arise from three mechanisms. A suppressive effect of the C gene when in trans to the D gene (e.g., D-ce/Ce), this is referred to as gene interaction. The second is when part of the D antigen is missing (partial D). Thirdly, the presence of an aberrant form of D (eg. at the molecular level) would result in weak phenotypic expression. The "weak D" actually refers to red cells with the aberrant Rh-D protein expressing reduced membrane surface D antigen<sup>(6)</sup>.

#### II. Materials and Methods

The study "Study of Prevalence of Weak D Antigen (D<sup>w</sup>) Amongst Supposed Rh Negative Blood Donors in a Tertiary Care Hospital of Jharkhand" was conducted in the Blood Bank of Rajendra Institute of Medical Sciences, Ranchi, Jharkhand. It is a retrospective study and data of 3yrs from January, 2015 to December, 2017 was collected. The immediate spin tube technique was used for Routine Rh typing. The samples which were negative for Rh using monoclonal (IgM) Anti-D reagent were further tested with polyclonal (IgM+IgG) Anti-D. The samples which were negative even after polyclonal Anti-D test were further tested by Indirect Antiglobulin Test (IAT).

A 5% suspension of the cells to be tested was made. Equal volumes (2 drops) of each of anti-D serum and 5% red cell suspension were placed in a clean glass tube, mixed well, and incubated at 37°C for 60 minutes. The tube was gently resuspended and the cell button was observed for agglutination. If the test red cells were agglutinated, the immediate spin tube test result was recorded as D antigen positive. If the test red cells were not agglutinated, the test was recorded as D antigen negative. Further, the D negative cells were washed 3-4 times with large volumes of normal saline. After the final wash, the saline was decanted and two drops of antihuman globulin serum was added and the tube centrifuged at 1000× g for 1 minute. The cell button was resuspended and examined for agglutination. All negative results were confirmed by microscope. The samples showing agglutination after addition of AHG serum were considered weak D positive. Parallel positive and negative controls were set up to rule out any DAT Positive sample.

#### III. Results

A total of 1,66,000 healthy blood donors were tested out of which total of 2013 (1.21%) blood donors turned out to be Rh-D negative during a span of 36 months from January, 2015 to December, 2017 and on further testing 7 (0.35%) of them turned out to be weak D positive. The detailed analysis is presented as follows-

**Table 1: Showing year wise Rh Blood Group Distribution and Weak D Positivity Among Blood Donors-**

Year	Total	Rh-D positive	Rh-D negative	Weak D positive
2015	60,012	59,321 (98.85%)	691 (1.15%)	4
2016	50,103	49,453 (98.70%)	650 (1.30%)	1
2017	56,223	55,551 (98.80%)	672 (1.20%)	2
Total	1,66,338	1,64,325 (98.79%)	2013 (1.21%)	7

**Table 2: Showing Frequency of Weak D Positivity Among Rh Negative Blood Donors-**

Year	Blood Group	Number	Weak D Positive	Percentage
2015	A Negative	134	1	0.75%
	B Negative	252	3	1.19%
	AB Negative	40	0	0%
	O Negative	265	0	0%
2016	A Negative	123	1	0.81%
	B Negative	246	0	0%
	AB Negative	38	0	0%
	O Negative	243	0	0%
2017	A Negative	130	1	0.77%
	B Negative	249	1	0.40%
	AB Negative	44	0	0%
	O Negative	249	0	0%
Total		2013	7	0.35%

#### IV. Discussion

In transfusion medicine, determination of weak D (and other D variants) is important to ensure blood safety. The incidence of weak D varies worldwide. The prevalence of 1.21% of Rh negative, among donors in this study is comparatively lower than Rh- negative donors of India. study. Among Indian population 5%-12% Rh- negativity has been reported<sup>(7,8)</sup>. In our study weak D prevalence of 0.35% has been reported. Among Indians 0.09%-0.189% prevalence has been reported<sup>(9)</sup>. So, results of our study is slightly higher compared to Indian population value. The result of our study is quite higher compared to one study conducted in Tripura (0.007%)<sup>(10)</sup> and slightly higher compared to one study done in Kashmir (0.2%)<sup>(11)</sup>. The results of our study is slightly in contrast to other studies due to various factors, the primary reason being the difference in epidemiology i.e. demographic profile and social milieu of the region.

## V. Conclusion

This study shows the prevalence of weak D antigen in our donor population (0.35%) is substantial. Not testing for the weak D antigen in the blood group may cause transfusion reactions and allo-immunization. It also stresses the need to identify individuals with variant D (rather than weak D or partial D) and to inform them about their status as donors and recipients of blood/or organs. For safe blood transfusion & to prevent transfusion related complications, comprehensive national transfusion guidelines need to be laid down to standardize the protocol for D antigen testing for donors as well as patients.

## VI. References

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