

## Study on weak D antigen (D<sup>u</sup>) at a Tertiary Healthcare Center in Blood Donors of Tripura

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**Abstract: Introduction:** The study on detection of weak RhD (D<sup>u</sup>) antigen among 4200 healthy blood donors at Tripura Medical College & Dr BRAM Teaching Hospital blood bank associated from January 2015 to December 2016.

**Method:** Blood samples that were negative for RhD by immediate spin tube method were tested for weak D by indirect antiglobulin test.

**Observation and results:** Among 4200 healthy blood donors, 4060(96.67%) were RhD factor positive while, 140(3.33%) were Rhd negative. Among these, 140 RhD factor negative individuals 1 (0.007%) were weak D positive.

**Conclusion:** Numerous studies conclude that weak D antigen is immunogenic and is capable of producing alloimmunisation if transfused to RhD negative subjects. Ergo, it is pertinent to also detect the Weak D or partial D status of those individuals who are negative with saline anti-D.

**Keywords:** Weak D antigen, Rh blood group.

### I. Introduction:

In 1939 Levine & Stetson discovered Rh antigen, following the discovery of ABO blood group systems by Landsteiner in 1901 <sup>(1)</sup> This was revolutionary in the field of transfusion medicine. A weakly reacting Rh antigen was first described by Stratton in 1946 <sup>(2)</sup> The Rh blood group system is important primarily because antibodies against Rh antigen are involved in hemolytic disease of the newborn, transfusion reactions, and hemolytic anaemia <sup>(3)</sup>

According to the presence or absence of the D antigen on the surface of their red blood cells individuals are categorised as RH positive or negative. The D antigen is the most immunogenic and therefore most critical in formulating a transfusion stratagem. The RhD blood group antigen has been shown to be subject to many phenotypic variations <sup>(4)</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>(5)</sup>

Table 1

Prevalence of Rh Positive & Rh Negative among Blood Donors				
	Rh positive		Rh negative	
	number	percentage (%)	number	percentage (%)
<b>MALE</b>	3780	90.01	108	2.57
<b>FEMALE</b>	280	6.66	32	0.76

### II. Material and Method:

The immediate spin tube technique was used for Routine Rh typing. Blood samples, which were negative for agglutination were further tested. Samples showing agglutination after incubation or addition of AHG serum were considered to be weak D. Appropriate controls were used. Equal volumes each of anti D serum and 2-5% washed red cell suspension were placed in a clean glass test tube. They were mixed and incubated at 37°C in a water bath for 15-20 minutes. The tube was gently resuspended and the cell button observed for agglutination. If the test red cells were agglutinated but not in the negative control tube, the test was recorded as positive and the test was made to proceed to the antiglobulin test phase. If the test cells were not agglutinated or the results were doubtful, the cells were washed three to four times with large volumes of normal saline. After the final wash, the saline was decanted and one to two drops of antiglobulin serum was added. Following this, the contents of the test tube were mixed and the tube was centrifuged at 1500 rpm for one minute. The

cell button was then gently resuspended and examined for agglutination. All negative results were confirmed under the microscope.

Table 2

PREVALENCE OF WEAK D ANTIGEN AMONGST SUPPOSED RH NEGATIVE BLOOD DONORS				
	Rh negative		D <sup>u</sup>	
	number	percentage (%)	number	percentage (%)
<b>MALE</b>	107	76.4	1	0.007
<b>FEMALE</b>	32	22.8	-	-

### III. Observation and Results:

The results of the present study to detection of weak Rh D (D<sup>u</sup>) phenotype among blood donors amongst 4200 healthy blood donors attending the blood bank of Tripura Medical College And Dr. BRAM Teaching Hospital, Agartala from January 2015 to December 2016.

### IV. Discussion:

The prevalence of 3.33% of Rh negative, among donors in this study is in keeping with available records of low prevalence of Rh- negative donors in other countries. Among Nigerians 1-6% has been reported and 3.9% among Kenyans<sup>(6)</sup>. High figures obtained elsewhere, for example, about 15% -17% among Europeans<sup>(7,)</sup> and 15% in the USA population<sup>(8)</sup> significantly vary from the low incidence of Rh-negativity in our study. Among Indian population 5%-12% Rh- negativity has been reported<sup>(9) (10)</sup>. This could be due to high RHD gene frequency among Indians population. Weak D prevalence 0.007% in our study has been reported . The result of our study is low to prevalence (0.4-%) among Moroccan population<sup>(11)</sup>. This is however, below(0.4-%) among Moroccan population<sup>(11)</sup>, the 0.59% and 0.8%, 0.8% prevalence reported among the Europe and Brazil , Pakistan respectively<sup>(12,13,14)</sup>. On the other hand , the 0.007% is lower to those found inferences in some other populations, for example, 0.14% prevalence in Albanias<sup>(15)</sup>. Among Indians 0.09%-0.189% prevalence has been reported<sup>(16) (17)</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:

Our study concluded that the incidence of Rh negative blood group was 3.33% in the Tripura region of North - East India. A similar study from this region has not been performed for comparison and this study, therefore may be used for future reference. We found a 0.007% weak D positivity. Several research studies proved that weak D antigen is immunogenic and is capable to produce allo-immunisation if transfused to RhD negative subjects. Ergo, it is imperative to also detect the Weak D or partial D status of those individuals who are negative with saline anti-D.

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