

# Frequency Distribution of ABO and Rh (D) Blood Groups amongst Pregnant Women: A Cross Sectional Survey

Seema<sup>1</sup>, Narendra Kumar<sup>1\*</sup>, Vinod Kapoor<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Physiology,  
Saraswathi Institute of Medical Sciences, Anawarpur, Hapur, Uttar Pradesh, India.

<sup>2</sup>Professor, Dept. of Pharmacology, SGT Medical College, Research Centre, Gurugram, Haryana, India.

## ABSTRACT

**Background:** The red cell membrane is a complex clinical entity and it contains various blood group antigens, out of these of significant clinical relevance are ABO blood group and Rh (D) blood group. The aim of the present study is to establish the prevalence of ABO and Rh (D) blood group amongst pregnant women reporting to the hospital.

**Materials and Methods:** The present prospective cross sectional survey was conducted in the Saraswathi Institute of Medical Sciences, Anawarpur, Hapur, Uttar Pradesh (India). Information regarding age and other demographic details was obtained from patients and filled in a pre-tested proforma. Under complete aseptic conditions, 5 ml of blood was withdrawn from the antecubital vein by trained personnel. Blood groups were estimated using forward and reverse typing with test tube agglutination method. All the data was arranged in a tabulated form and analysed using SPSS software.

**Results:** This cross sectional study enrolled a total of 3024 pregnant women. Out of these the mean age of the subjects was 29.26 +/- 6.02 years. There were 40.9% (n=1237) subjects with O blood group. Amongst them there were 96.1% (n=1188) who had D positive and 3.9% (n=49) who had D negative. A blood group was seen in 28.1% (n=847) subjects. Amongst them, there were 97.2% (n=826) who had positive and 2.8% (n=21) who had negative D blood group. Total 50.5% subjects

were between 18-24 years, 29.9% were between 25-34 years and 19.5% were more than 34 years. There were 39.9% subjects with O blood group between the ages of 18-24 years, 41.8% subjects were between 25-34 years and 41.8% were more than 34 years of age.

**Conclusion:** The most common phenotype in our study was O followed by A then B and least common was AB. The prevalence of Rh negative blood group was only 2.9% and that of Rh positive was 97.1%.

**Keywords:** Agglutination, Blood Group, Pregnant, Red Cell.

## \*Correspondence to:

**Dr. Narendra Kumar,**  
Associate Professor,  
Department of Physiology,  
Saraswathi Institute of Medical Sciences,  
Anawarpur, Hapur, Uttar Pradesh, India.

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## INTRODUCTION

The red cell membrane is a complex clinical entity and it contains various blood group antigens, out of these of significant clinical relevance are ABO blood group and D blood group. Under ABO blood group, there are four major blood groups; A, B, AB, O which are based upon the presence of two blood group antigens A and B. Individuals who have both the antigens belong to AB blood group and absence of any blood group antigen have O blood group. If the individual has antigen on the red blood cell i.e. A or B then they lack that specific agglutinin in the serum.<sup>1-3</sup> Rh or the Rhesus blood group is determined by D antigen. Presence of D antigen in the RBCs makes the individuals Rh positive and absence of D antigen makes them Rh negative.<sup>4</sup> The major clinical relevance of the blood group determination is the ability to cause haemolytic transfusion reactions and haemolytic disease of newborns.<sup>5-7</sup> There is varied prevalence of the ABO and Rhesus blood group among race to race and individual to individual.

Knowledge about blood groups is crucial for various clinical studies; it also aids in establishing geographical information and reduces mortality rate and the incidence of preventable deaths by access to sufficient blood supply. Information about blood groups not only helps in transfusion practice but also in various genetic studies and resolving paternity cases. Certain type of blood groups are more related to particular disease and environment and hence their knowledge can be used for establishing prevention strategies.<sup>8</sup> Therefore it becomes increasingly important to obtain knowledge and information about blood group in any population.<sup>9</sup> Diseases like duodenal ulcer, diabetes mellitus, urinary tract infection, Rh incompatibility and ABO incompatibility of newborn and recently with anaemia have been found to be associated with specific blood groups.<sup>9</sup> The aim of the present study is to establish the prevalence of ABO and D blood group amongst pregnant women reporting to the hospital.

**MATERIALS AND METHODS**

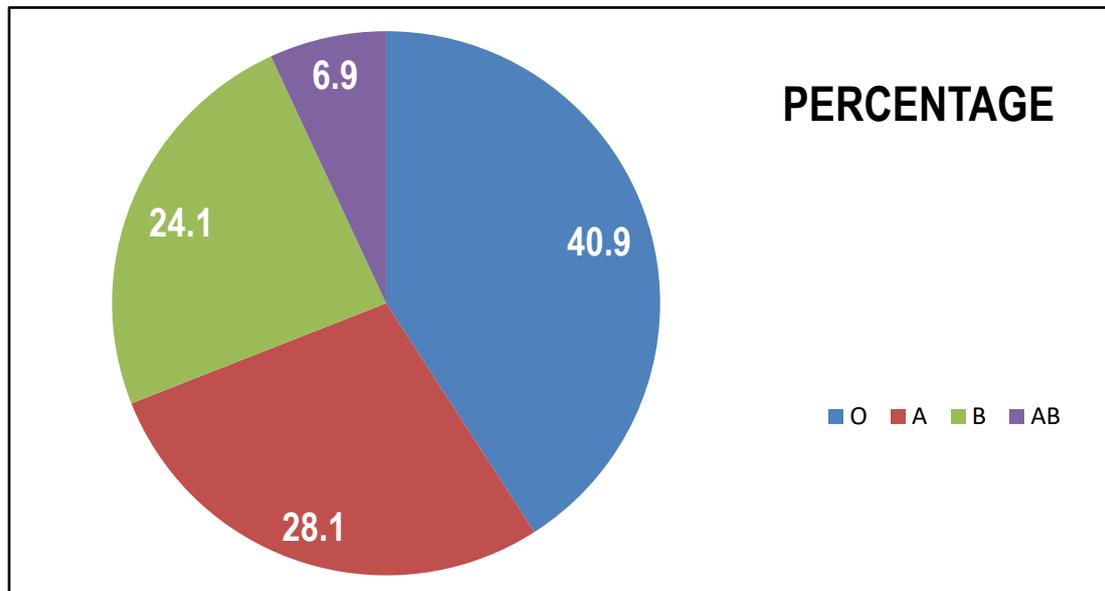
The present prospective cross sectional survey was conducted in the Saraswathi Institute of Medical Sciences, Anawarpur, Hapur, Uttar Pradesh (India). Every year there is hundreds of blood group testing performed for pregnant mothers for safe deliveries. The study was approved by the Institute's ethical board. All the subjects were informed about the study and a written consent was obtained from all in their vernacular language. Pregnant women more than 18 years were included in the study. A total of 3024 women were included in the study. Information regarding age and other demographic details was obtained from patients and filled in

a pre-tested proforma. Under complete aseptic conditions, 5 ml of blood was withdrawn from the anticubital vein by trained personnel. Blood groups were estimated using forward and reverse typing with test tube agglutination method. In order to confirm Rh blood group, antiglobulin technique was applied. Presence of agglutination was checked both macroscopically and microscopically. Indirect antiglobulin test was also performed in cases of negative results to confirm the results. All the data was arranged in a tabulated form and analysed using SPSS software. The results are expressed as percentage of total value.

**Table 1: Prevalence of ABO and D blood group**

BLOOD GROUP	TOTAL (N/%)	D POSITIVE (N/%)	D NEGATIVE (N/%)
O	1237 (40.9%)	1188 (96.1%)	49 (3.9%)
A	847 (28.1%)	826 (97.2%)	21 (2.8%)
B	727(24.1%)	711 (97.8%)	16 (2.2%)
AB	211 (6.9%)	208 (98.6%)	3 (1.4%)
<b>TOTAL</b>	<b>3024 (100%)</b>	<b>2935 (97.1%)</b>	<b>89 (2.9%)</b>

**Graph 1: Prevalence of ABO group blood group**



**Table 2: Prevalence of ABO blood group amongst different age groups**

BLOOD GROUP	AGE (YEARS)			TOTAL
	18-24	25-34	>34	
O	610 (39.9%)	380 (41.8%)	247 (41.8%)	1237 (40.9%)
A	427 (27.9%)	263 (28.9%)	159 (26.9%)	847 (28.1%)
B	381 (24.9%)	217 (23.9%)	129 (21.8%)	727(24.1%)
AB	109 (7.1%)	47 (5.2%)	55 (9.3%)	211 (6.9%)
<b>Total</b>	<b>1527 (50.5%)</b>	<b>907(29.9)</b>	<b>590 (19.5%)</b>	<b>3024 (100%)</b>

**RESULTS**

This cross sectional study enrolled a total of 3024 pregnant women. Out of these the mean age of the subjects was 29.26 +/- 6.02 years. Table 1, Graph 1 shows the prevalence of different age groups. There were 40.9% (n=1237) subjects with O blood group. Amongst them there were 96.1% (n=1188) who had D positive and 3.9% (n=49) who had D negative. A blood group was seen in 28.1% (n=847) subjects. Amongst them, there were

97.2% (n=826) who had positive and 2.8% (n=21) who had negative D blood group. There were 24.1% (n=727) subjects with B blood group. Amongst them 97.8% (n=711) had positive and 2.2% (n=16) had negative D blood group. AB blood group was seen in 6.9% (n=211) subjects. There were 98.6% (n=208) who were D positive and 1.4% (n=3) who were D negative. Out of total there were 97.1% who were Rh positive and 2.9% who were Rh negative.

Table 2 illustrates the distribution of blood group according to age. Total 50.5% subjects were between 18-24 years, 29.9% were between 25-34 years and 19.5% were more than 34 years. There were 39.9% subjects with O blood group between the ages of 18-24 years, 41.8% subjects were between 25-34 years and 41.8% were more than 34 years of age. There were 27.9% subjects with A blood group between the ages of 18-24 years, 28.9% subjects were between 25-34 years and 26.9% were more than 34 years of age. There were 24.9% subjects with B blood group between the ages of 18-24 years, 23.9% subjects were between 25-34 years and 21.8% were more than 34 years of age. There were 7.1% subjects with AB blood group between the ages of 18-24 years, 5.2% subjects were between 25-34 years and 9.3% were more than 34 years of age.

## DISCUSSION

The distribution of ABO blood group varies amongst different geographical and ethnic classes. In majority of the cases, O positive is the common blood group followed by A and AB is the rarest. In study conducted by F.A. Bhalti et al amongst subjects of Pakistan, B blood group was the most common.<sup>11</sup> In a similar study conducted in Nepal, Blood group A was the most prevalent phenotype.<sup>12</sup> In our study, there were 40.9% (n=1237) subjects with O blood group. A blood group was seen in 28.1% (n=847) subjects. AB blood group was seen in 6.9% (n=211) subjects. There were 24.1% (n=727) subjects with B blood group. The most clinically significant blood group system is ABO blood group because of the occurrence of regular antibodies which can cause transfusion reactions and haemolytic disease of newborns.

In a study conducted amongst the Guinean population by Loua A et al, the frequencies of A, B and O in the population were 14.70, 15.48, 69.83 respectively.<sup>13</sup> In other studies conducted by authors like Erhabor and colleagues<sup>14</sup>, Jerimiah<sup>15</sup>, Worledge and colleagues<sup>16</sup>, Falusi and colleagues<sup>17</sup> and Omotade and colleagues<sup>18</sup> on the prevalence of ABO and Rh blood groups and concluded that the prevalence pattern was O > A > B > AB amongst students of African descent in Port Harcourt, amongst students at the Niger Delta, amongst the ethnic groups of Yoruba and Hausa, in five zone of Nigeria and in Ibadan respectively. In our study, the age prevalence was total 50.5% subjects were between 18-24 years, 29.9% were between 25-34 years and 19.5% were more than 34 years. There were 39.9% subjects with O blood group between the ages of 18-24 years, 41.8% subjects were between 25-34 years and 41.8% were more than 34 years of age. There were 27.9% subjects with A blood group between the ages of 18-24 years, 28.9% subjects were between 25-34 years and 26.9% were more than 34 years of age. There were 24.9% subjects with B blood group between the ages of 18-24 years, 23.9% subjects were between 25-34 years and 21.8% were more than 34 years of age. There were 7.1% subjects with AB blood group between the ages of 18-24 years, 5.2% subjects were between 25-34 years and 9.3% were more than 34 years of age. According to a study by Alemu, Megbaru et al amongst pregnant women of Ethiopia, found that about majority of the women screened were in the age range of 17-24 years, 50.5%. On the other hand there were 29.5 % between 25-29 years of age and the rest 20 % were between the ages of 30-40 years.<sup>19</sup> In our study, 97.1% subjects were Rh positive and 2.9% were Rh negative. The distribution of D blood group also varies worldwide.

In a study conducted in South India, the prevalence of Rh(D) negative blood group was documented to be 5.5%,<sup>20</sup> In Nairobi it was 5%,<sup>21</sup> in Nigeria it was 4.8%,<sup>18</sup> and it was 7.7% in Rawalpindi.<sup>11</sup> A study shows that approximately 95% of African – Americans are Rh-positive whereas 100% of indigenous Africans are virtually Rh-positive.<sup>22</sup>

## CONCLUSION

The most common phenotype in our study was O followed by A then B and least common was AB. The prevalence of Rh negative blood group was only 2.9% and that of Rh positive was 97.1%. The study of blood groups is very important for establishing incidence of transfusion reactions and prevent complications regarding the same.

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