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Frequency of ABO blood group and Rh incompatibility among certain population of Bihariganj, Madhepura

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Abstract- In humans, four types of blood groups A, B, AB, and O are present and their inheritance in humans is by the multiple allele method. Recognition of blood group is based on the presence of a special glycoprotein called antigen on the membrane of RBC and also by the absence of antibody in plasma. The person with A blood group has antigen A on the membrane of RBC and antibody B in plasma. Like this, a person with blood group B has antigen B on RBC and antibody A in plasma. In blood group AB, Antigen A and B both are present on the membrane of RBC and there is no kind of antibody present in plasma. There is no kind of antigen present on RBC of people with blood group O. In such people both types of antibodies, A and B are present in blood plasma. The control of inheritance of blood groups is done by gene I which is responsible for the production of antigen. There are three types of allele of gene I. They are I^A, I^B, and I^O. All alleles of gene I are found in persons of all races and ethnicities. Antigen A and B are produced by alleles I^A and I^B, respectively, while I^O does not produce any antibodies.

Key words: ABO blood group, Antibody, Antigen, Rh incompatibility, RBC.

INTRODUCTION

In human beings, ABO is the major blood group system. The presence and absence of two genes A and B decide the blood group of any person (Male or Female). The majority of ABO determinants are expressed on the ends of long poly lactosamine chains.¹

The determination of type of blood group is done by the antigenic properties of RBC. On the surface of Red Blood Cell, 30 different varieties of blood group antigens are present. On the external surface of RBC, A and B antigens are very important complex oligosaccharides.

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Against these two antigens, antibodies are produced in the blood plasma throughout a person's life. On the basis of presence of agglutination and antigen, there are four different types of blood groups that exist. They are A, B, AB, and O.

Offering appropriate blood components, which the patient needs, is the main and most important function of blood centers or banks. So, blood grouping is very essential. Therefore, in blood banks or blood centers, blood grouping has taken the top place. Most famous blood group in transfusion medicine is the ABO and Rhesus blood group.^{2,3} Hence, in routine practice attention is paid to Rh and ABO system as a compatibility test in any blood center or blood

bank transfer service. Due to its relation to the hemolytic disease of the newborn baby Rh and ABO blood has clinical importance.⁴ Human RBC contain one another antigen, antigen D (Rh). People are called Rh-positive when they possess antigen and people who do not possess this type of antigen are called Rh-negative. It varies from the ABO system in that matching antibodies (agglutinins) are not produced spontaneously unless Rh (+ve) blood is transfused to Rh (-ve) people.

Because the distribution of this blood group system varies from race to race, understanding the ABO and Rh distribution in a given community is critical. Among the Western Europeans blood group O is most common about 46%, blood group A is about 42%, AB is about 3% and group B is about 9% whereas Eastern Europeans have a higher proportion up to 40% of blood group B blood.⁵ The frequency of blood group O becomes 45 % in American people and the percentage of blood group B, AB & A is 10%, 4% & 41% respectively. Existing research suggests that 85 percent of Caucasians are Rh-positive whereas 15% are Rh-negative in the case of Rh grouping.^{6,7} Rh positivity is 100 percent among Indigenous Africans, but it is roughly 95 percent among African-Americans. The ABO group's distribution among people varies depending on race.⁸

The Rh factor and ABO blood group of the Bihariganj, Madhepura is not well documented. Thus the aim of present study was to fill this gap on the bio-genetic map of this region of District Madhepura of State Bihar by providing data on the ABO-Rh blood group system.

OBJECTIVE

The main goal of the study was to determine and document the ABO and rhesus blood groups in a random sample of persons from three castes in Bihariganj block, Madhepura.

METHODOLOGY

The present study was a case-control study and was designed and approved by the Research ethical committee, Department of Zoology, Bhupendra Narayan Mandal University, Madhepura. The participants of this study came from the village of block Bihariganj of Madhepura District of State Bihar. Three castes Brahmin, Kalwar, and Mushahar of village Madhukarchak, Gangaura, Rajghat, Laxmipur, Belahi, Babhangama, Mohanpur, Vishanpur, Tulsia, Baijnathpur, Madhuvan, Mahikhand, Gamail,

Tintenga of Bihariganj block have been incorporated in this study. This study did not include people over the age of 60 or those under the age of 18. To confirm the survey results the blood groups of 600 randomly selected people of all three castes (Brahmin, Kalwars, and Mushahar) have been determined.

Table 1: The table shows the total number of samples. 600 samples have been collected from the three different castes (200 from each caste)

	Brahmin	Kalwar	Mushahar	Total
Total no of sample	200	200	200	600
Male	107	121	147	375
Female	93	79	53	225
Male %	53.5	60.5	73.5	
Female %	46.5	39.5	26.5	

Finger pricks with a sterile lancet were used to obtain samples for ABO blood group testing.⁹ The monoclonal antiserum (Spinreact, Spain) anti-A, anti-B, and anti-D (Rh) were used for blood group phenotyping by slide method. The manufacturer's procedural instructions were followed. A drop of anti-A, anti-B, and anti-D was placed on a designated slide, and a drop of test cells was added to each and mixed. As soon as they were mixed, the agglutination results were recorded. Blood group has been assigned to group A when agglutination occurs in blood drop A, while agglutination in blood drop B was assigned to group B. The blood group was considered AB if both blood drops agglutinated, and the blood group was considered O if neither blood drop agglutinated. Rh blood drop agglutination was deemed Rh-positive, while non-agglutination was called Rh-negative. The distribution of different blood groups among all three castes of the Bihariganj population was expressed as a percentage.

RESULT AND DISCUSSION

The ABO blood groups are natural and found universally. They are also highly reactive. These are the two most important clinical implications of the ABO blood group antigen. In blood transfusion, the ABO and Rh blood type systems are the most regularly used grouping methods. They are the most immunogenic of all the blood type antigens in transfusion medicine.⁹ When an incompatible type of ABO blood is transfused, it is the most prevalent cause of death from a blood transfusion. The physiological activities of ABO blood group antigens, despite their evident clinical importance, are unknown. Although no disease has been connected to the lack of

expression of ABO blood group antigens, a person's ABO phenotype has been associated with their vulnerability to a variety of diseases. Many of the links are still debated such as, in people having blood group A the case of stomach cancer is most common and it is a fact, but gastric and duodenal ulcers are more common in group O people.¹⁰

The data on ABO and Rh blood types of 600 persons from the three castes Brahmin, Kalwars, and Mushahar of Bihariganj population of Madhepura district were analyzed in the current study. The distribution of blood groups A, B, AB, and O among the population can be seen in Table 2.

Table 2: The table shows the distribution of blood group among three castes of 600 people

	Blood Groups											
	A			B			AB			O		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Brahmin	58	16	74	22	11	33	5	7	12	46	35	81
Kalwars	46	36	82	10	4	14	2	9	11	57	36	93
Mushahar	44	34	78	18	26	44	7	1	8	55	15	70

Table 3: Comparison of the distribution of different ABO blood groups among three castes

Study	Blood Group A	Blood Group B	Blood Group AB	Blood Group O	Rh Positivity	Rh Negativity
Brahmin	74 (M-58, F-16)	33 (M-22, F-11)	12 (M-5, F-7)	81 (M-46, F-35)	198	2
Kalwars	82 (M-46, F-36)	14 (M-10, F-04)	11 (M-9, F-2)	93 (M-55, F-15)	199	1
Mushahar	78(M-44, F-34)	44 (M-18, F-26)	08 (M-7, F-1)	70 (M-55, F-15)	200	0
Total	234	91	31	244	597	3

This study showed that among 600 people 40.66% population are with blood group O whereas 39% of people with blood group A. Blood groups B (15.16 percent) and AB (5.16 percent) account for a very small percentage of the population. (Figure 1)

Among all 3 castes of 600 people (200 people in each caste), the frequency of blood group in Brahmin caste is 74 of which 72 shows Rh positivity and two people show Rh negativity. In Kalwar 82 people with blood group A and shows 100% Rh positivity whereas in Mushahars the frequency of blood group A becomes 78. The distribution of blood group A among the population can be seen in Table 4.

The frequency of the B blood group among Brahmin is 33 and in Kalwars and Mushahars its frequency becomes 14 and 44 respectively. The distribution of blood group B among the population can be seen in Table 5.

The frequency of blood group AB among Brahmin is 12. In Kalwar 11 people with blood group AB, 10 people with Rh positivity whereas one person with Rh negativity. In Mushahars frequency of the AB blood group is 8 with a hundred percent of positivity. The distribution of AB blood groups among the population can be seen in Table 6.

The prevalence of blood group O among all three castes, Brahmin, Kalwars, and Mushahar is 81, 93, and 70 respectively with 100% of Rh positivity. The distribution of blood groups O among the population can be seen in Table 7.

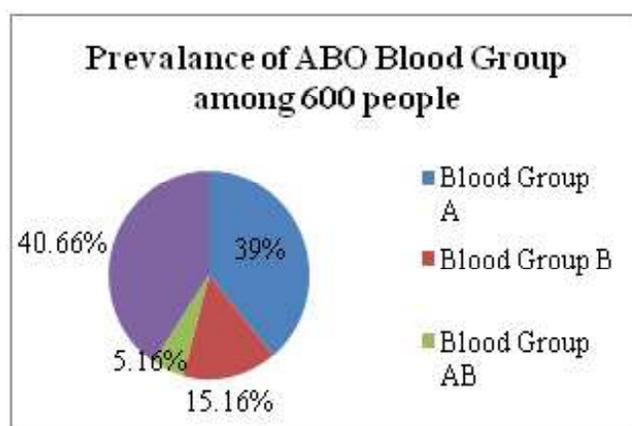


Figure 1: Prevalence of ABO Blood Group among 600 people

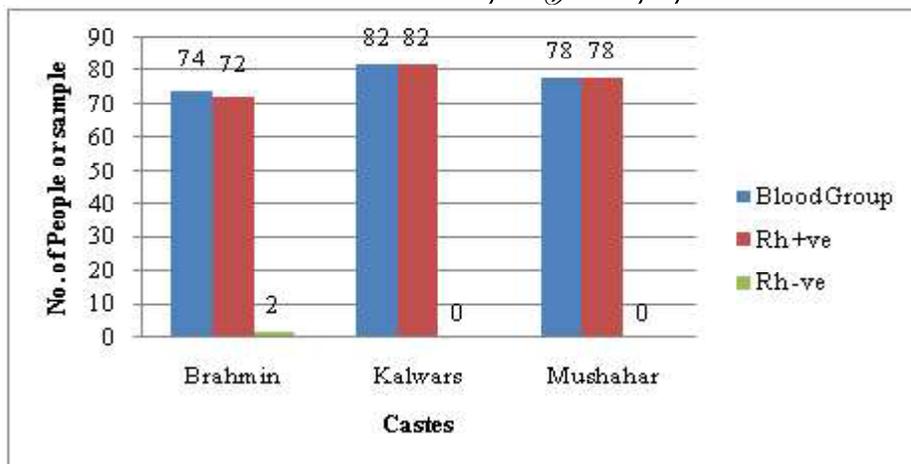


Table 4: Total number of people with blood group A among three castes of 600 people

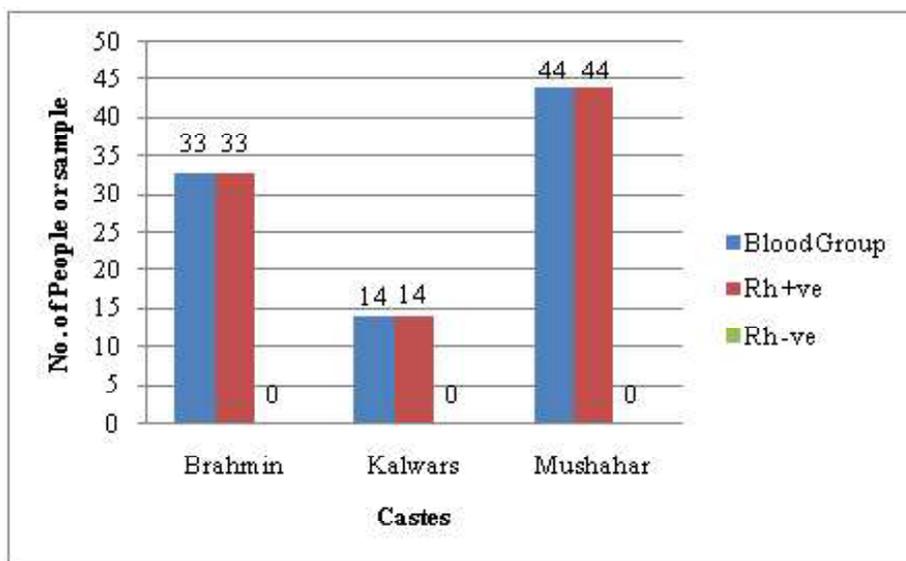


Table 5: Total number of people with blood group B among three castes of 600 people

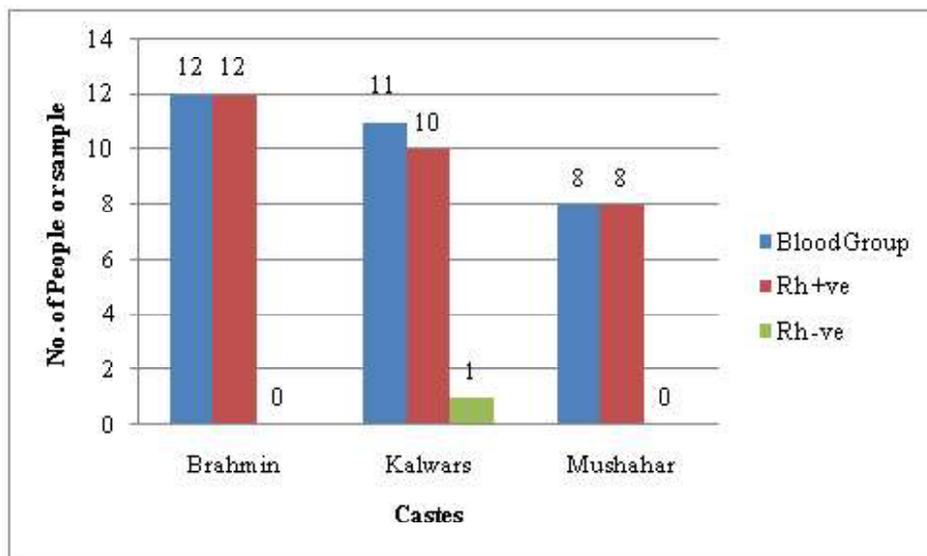


Table 6: Total number of people with blood group AB among three castes of 600 people

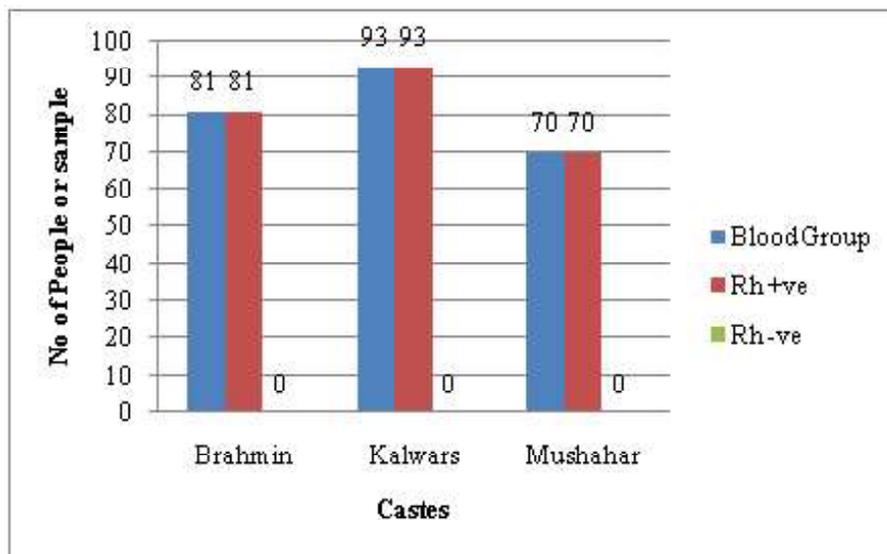


Table 7: Total number of people with blood group O among three castes of 600 people

CONCLUSION

As a summary of the entire study, it was observed that the blood group O +ve are the characteristic of all three castes of the Bihariganj block. Among 600 people, the popularity of the O +ve blood group is 244. Blood group A is the second commonest blood group among Brahmin, Kalwars, and Mushahars of Bihariganj block. The prevalence of Blood group A is 234. In the present study, the blood group which is least common is blood group AB. Its frequency is 31 in 600 people. Blood group B is found in 91 out of 600 persons. 99.5% of people are with the Rhesus blood group and the Rh factor is absent in the remaining 0.5% of people.

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