



## Association between blood groups and blood hemoglobin levels in rural region of west champaran comprising 18–45 years age group.

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### KEYWORDS

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### ABSTRACT

**Aim:** The aim of the present study was to assess the association between blood groups and blood hemoglobin levels in rural population comprising 18–45 years age group.

**Methods:** The study was done Department of Physiology, Government Medical College, Bettiah, Bihar, India. after obtaining approval from the Institutional Human Ethics Committee. A total number of 200 subjects were recruited for the study. The subjects were recruited from the common rural population in and around in the Bihar region. Apparently healthy males and females of the age group 18–45 years were included in the study.

**Results:** In the present study, there were 120 male and 80 females. There was no significant relationship between male and female in their blood group. P-value = 0.150 which is greater than 0.05. The distribution of Rh positive and Rh negative varies among the ABO blood groups. There are significant differences in the distribution of Rh positive and negative among the groups. 2% patients having Rh negative blood group has low Hb concentration while percentage of participants with Rh positive blood group having low Hb concentration is 7.5%. 92.5% participants were Rh positive having normal Hb concentration. In our study we found that participants with blood group B are more prone for anemia, followed by O, AB and blood group A.

**Conclusion:** We concluded that individuals with blood group B are more prone to anaemia followed by blood group O, A and least is with blood group AB. Based on their blood groups, we can advise regular intake of diet rich in iron and vitamins or also their supplements to the individual who are more susceptible to anaemia.

### INTRODUCTION

Blood is a unique type of connective tissue with an unalterable and full identity. It offers one method of establishing a link between the cells of various bodily sections and the outside world.<sup>1</sup> Blood transfusions are a crucial component of modern medical treatment for replenishing lost blood.<sup>2</sup> In human blood cells, particularly on the membrane-surfaces of the cell, at least 30 frequently occurring antigens and hundreds of additional unusual antigens have been identified. Since the majority of the antigens are weak, their significance lies mostly in the research of gene inheritance to determine parentage. Blood transfusion responses are far more likely to be brought on by two specific antigen types than by the others. They are the Rh system and the A B O system of antigens. The two most important clinically significant blood group antigens are Rh and

ABO. The fourth system to be identified was the rhesus blood group system.<sup>1</sup> According to the presence of antigens and agglutinins, ABO blood group individuals are split into four primary blood groups, namely, A, B, AB, and O. Type A antigens are found in blood group A, type B antigens are found in blood group B, and neither A nor B antigens are found in blood group O. A similar antigen, known as the Rhesus antigen, was initially identified in Rhesus monkeys. Between 85% and 90% of individuals have this protein in their red blood cells.

Anemia affects 1.62 billion (95%), or 24.8% of the world's population, according to the World Health Organization (WHO) statistics on the condition. According to the WHO, anemia causes 20% of maternal and neonatal deaths in underdeveloped nations.<sup>4,5</sup> A condition where the overall amount of hemoglobin (Hb) or the quantity of red blood cells (RBCs) is inadequately



decreased is known as anaemia. In order to be considered anemic, a person's hemoglobin (Hb) must be below 130 g/L in males over the age of 15, 110 g/L in pregnant women, and 120 g/L in non-pregnant women over the age of 15.<sup>6,7</sup>

A1 and O blood types were found to have low hemoglobin levels in research conducted among Bengalee households in Calcutta. In the Dhimal community of Naxalbari in the Darjeeling district of West Bengal, India, people with blood group B have mean hemoglobin levels that are greater than those of those with other blood types.<sup>9</sup> In comparison to other blood groups in the population of Southeastern Nigeria, serum iron and total iron-binding capacity (TIBC) were considerably lower in both males and females with O blood group.<sup>10</sup>

The current study's objective was to evaluate the relationship between blood types and blood hemoglobin levels in rural residents of 18-45 years of age group.

## MATERIALS AND METHODS

The study was done Department of Physiology, Government Medical College, Bettiah, Bihar, India for one year after obtaining approval from the Institutional Human Ethics Committee. A total number of 200 subjects were recruited for the study. The subjects were recruited from the common rural population in and around in the Bihar region. Apparently healthy males and females of the age group 18–45 years were included in the study.

Subjects with a history of anemia, bleeding disorders, and malignancies were not included in the study. Furthermore, subjects with chronic cardiovascular, respiratory or renal diseases, or with a history of chronic drug intake were excluded from the study. Subjects who are chronic smokers or alcoholics were also excluded from the study.

Blood was collected by finger prick method. The procedure was done under strict aseptic precautions.

Blood group of the individuals was checked by slide method using antisera A, B, and D (Spanclone, Arkray). Few drops of blood were mixed with NaCl in a test tube. A drop of each antisera A, B, and D was added in three slides and slides were named as A, B, and D. Then, a drop of blood admixed with NaCl was added to all three slides and mixed well with three different wooden sticks. A control slide with a drop of blood with NaCl is also kept to rule out any self-agglutination. The slides were kept covered with Petri dish to prevent any evaporation of antisera for 10 min. After 10 min, the slides were observed for agglutination and the blood groups were determined accordingly. Blood hemoglobin levels were estimated using the instrument hemo control (EKF diagnostics). The finger pricked blood was collected into a hemoglobin microcuvette and this was fed into hemo control. The hemoglobin levels were displayed digitally. The values were recorded. The ABO and Rhesus blood grouping were done using the slide method. A drop of blood from each student was placed on a clean dry glass slide in three places. A drop of each of the antisera, anti A, and anti B and anti D was added and mixed with each blood sample with the aid of plastic stick. Blood groups were determined on the basis of agglutination reaction. Hemoglobin concentration was estimated by Acid Haematin method. This method is based on the principle that haemoglobin present in a sample of blood is converted into acid haematin by addition of N/10 HCl to the blood and its haemoglobin content is determined by matching the brown colour of the solution against a non-fading coloured glass.

Data were transferred to Microsoft Excel sheet. The blood hemoglobin values of different blood groups were tabulated. Statistical analysis was done using non-parametric tests with SPSS software version 20.

## RESULTS

Table 1: Patient details

Gender	N	%
Male	120	60
Female	80	40
Blood groups		
A –ve	2	1
A+ve	56	28



B-ve	4	2
B+ve	72	36
AB-ve	0	0
AB+ve	4	8
O-ve	2	1
O+ve	60	30

In the present study, there were 120 male and 80 females. B+ve were the most common followed by O+ve blood group.

Table 2: Sex wise distribution of Rh blood groups

Blood Group	Rh group	Rh group	Rh group	Rh group	Rh group	Total Rhgroup	Total=200
	Negative	Positive	Negative	Positive	Total Negative	Total Positive	
	Female	Female	Male	Male			
A	4	25	2	40	6	65	71
B	2	15	2	25	4	40	44
AB	0	8	2	15	2	23	25
O	4	22	2	32	6	54	60
Total	10	70	8	112	18	182	200

There was no significant relationship between male and female in their blood group. P-value = 0.150 which is greater than 0.05. The distribution of Rh positive and Rh

negative varies among the ABO blood groups. There are significant differences in the distribution of Rh positive and negative among the groups.

Table 3: Distribution of Hemoglobin concentration on the basis of Rh blood groups

Gender	Hb concentration				Total
	<12gm/dl (low)	%	>12gm/dl (Normal)	%	Total
Female	11	5.5	105	52.5	116
Male	4	2	80	40	84
Total	15	7.5	185	92.5	200

2% patients having Rh negative blood group has low Hb concentration while percentage of participants with Rh positive blood group having low Hb concentration is 7.5%. 92.5% participants were Rh positive having normal Hb concentration.

Table 4: Blood group wise distribution of Hemoglobin Concentration

Blood group	Hb concentration		Total
	<12gm/dl (low)	>12gm/dl (Normal)	
A	4	60	64
B	8	35	43
AB	2	15	17
O	6	70	76
Total	20	180	200

In our study we found that participants with blood group B are more prone for anemia, followed by O, AB and blood group A.



## DISCUSSION

Anemia can be brought on by a variety of factors, but inadequate nutrition is by far the most common. Although it is common throughout the world, it is especially problematic in developing countries like India because one of the most common causes—and a factor that can be corrected—is dietary deficiencies. Young children and expectant mothers are the most at risk groups because they experience the effects of nutritional deficiency anemia. 33 different blood types are recognized by the International Society of Blood Transfusion.<sup>11</sup>

A, B, AB, and O are the main blood types, and Rh can be positive or negative. Individuals' blood types are genetically established by coding for certain antigens on the red cell membrane. There are several studies that link the ABO blood types to illness causation. Females with non-O blood types have a 40–60% increased chance of developing ovarian cancer.<sup>12</sup> It is well known that having an A blood type puts one at higher risk for developing stomach cancer. RhD antigen is present on the surface of red blood cells in 13 Rh positive persons but is absent in Rh-negative individuals. Blood type antigens are crucial for blood transfusion and organ transplantation, but they also have a role in the development of certain disorders, including duodenal ulcer, diabetes mellitus, urinary tract infection, and infant Rh incompatibility.<sup>1</sup> There were 80 females and 120 males in the current research. The blood group B+ve was the most prevalent, followed by O+ve. There was no discernible difference in the blood groups of the sexes. P-value is larger than 0.05 at 0.150. Among the ABO blood types, there are varying proportions of Rh positive and Rh negative individuals. The distribution of Rh positive and Rh negative within the groupings differs significantly. Among Western Europeans, group A makes up 42%, group B 9%, group AB 3%, and group O the remaining 46%. In the US, the distribution of black people is as follows: group O, 46%; group A, 27%; group B, 2%; and group AB, 7%.<sup>13,14</sup> Similar to other countries, Pakistan has a higher prevalence of blood group O (35%), followed by blood groups A (24%), B (33%), and AB (8%). Blood group O makes up 55.3% of the population in Lagos, Nigeria, followed by blood groups A (25.3%), B (16.7%), and AB (2.7%).<sup>15</sup>

As a result, the distribution of the genes responsible for the ABO blood types has always followed a certain pattern. The blood group AB has the lowest proportion in this study, which is usually highly unusual and has also been the case in other earlier investigations.

According to this study, 91% of people have Rh positive blood, whereas just 9% have Rh negative blood. In another research, a similar distributional trend was seen. According to research, the prevalence of the Rh-negative blood group is 5.5% in south India, 5% in Nairobi, Kenya, 4.5% in Nigeria, 7.5% in Lahore, and 7.7% in Rawalpindi.<sup>16-19</sup>

When there is a negative iron balance, such as blood loss, a prolonged iron-deficient diet, fast development in children and adolescents, pregnancy, or breastfeeding, iron deficiency often develops gradually over time.<sup>20</sup> It is advised to conduct further study to pinpoint the precise causes of low hemoglobin concentration; this will assist policymakers implement steps to raise mothers' and healthcare professionals' understanding of nutrition.

## CONCLUSION

We came to the conclusion that those with blood type B are more likely to suffer from anemia, followed by those with blood group O and A, and the least likely are those with blood group AB. Individuals who are more prone to anemia can be identified based on their blood groups, and we can provide them with recommendations for a diet that is regularly high in iron and vitamins, as well as vitamin and iron supplements.

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