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A Study of Correlation Between Blood Groups and Anaemiain Adults in a Tertiary Care Hospital of Pilkhuwa

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Abstract

Background: Anemia is a global nutritional problem common in developing countries and affectsa thirdpopulation of world's with serious consequences. Most common type of anemia is iron deficiency anemia and megaloblastic anemia. There are several studies reported on the association between blood groups and hemoglobin phenotypes. A study to know whetherthere is any relation between ABOblood groups andoccurrence ofanemia according tosex andin different age groups among the randomly selected population atG.SMedical college and Hospital, Pilkhuwa, Hapur(UP) India.**Material and Methods:**The present prospective study were conducted in the department of pathology atG.S Medical College and hospital, Pilkhuwa, Hapur, (U P) for period of2 months, after taking the approval of the protocol review committee and institutional ethics committee. A total number of342 patientsaged18 – 74years were included in this study. Blood sample wastaken under aseptic conditions. ABO and Rh factorwere determined byglass slide method using ABO kit.Hemoglobin is determinedby using hematology autoanalyzer 5 partMindrey.**Results:**In our study out of 342, 59 males and 283femaleswere between the ages of18-74.The most frequentblood group wasB (37.4 %)followed by O (27.3%),A (23.1%) andAB (12.2%) respectively. Anemia is most frequent in blood group B followed by O, A andleast in AB. Among the femalesfrequency of anemia is more atageof25-34(26.9%)followed by35-44 (19.5%), 18-24(16.4%) 45-54(11.4%)55-64 (8.2%) and least at age of 65-74 (3.5%), while In comparison thefrequency of anemia in malesis more at the age of 35-44 (5%) followed by 45-54(4.3%) 55-64 (3.2%)65-74(2%), 18-24(1.8%) 25-34(0.9%).**Conclusion:** --The study authorises that blood group B is the commonest of the ABO blood group system in the randomly selected population and the AB blood group is the least. The frequency of Rh+ve

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was much commoner than Rh-ve. It is also observed that individuals with blood group B are more prone to anemia followed by blood group O, A and least is with blood group AB.

Keywords: Blood Donors, Blood Banks, Blood Group,Hemoglobin, India.

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Introduction

Blood is a specialized connective tissue with complete and unchangeable identity. It provides one of the means of connection between the cells of different parts of the body and external environment.[1] Anemia is defined as a clinical condition which is characterized by reduction in hemoglobin concentration of the blood below the normal for the age.[2] It is a global problem, mainly affecting poor people in developing countries.[2,3] Anemia during adolescence severely impairs the physical and mental development; weakness, behavioral & cognitive development; reduces physical fitness; decreases the work performance and even contributes to the adverse pregnancy outcome.[1]

As per the World Health Organization (WHO) database on anemia globally, anemia affects 1.62 billion people (95%), which corresponds to 24.8% of the population. WHO also estimates that anemia contributes to about 20% of maternal and perinatal death in developing countries.[4,5]

Human ABO blood type antigens exhibit alternative phenotypes and genetically derived glycoconjugate structures that are located on the red cell surface which play an active role in the cells' physiology and pathology.[6,7] The ABO blood group system has been of great importance in different disease studies.[8] The presence and absence of antigens in some blood types result in blood membrane alterations in both morphology and function. The functions dependent on the structure of blood types can associate the blood groups with diseases as well as health.[6,9] In addition to RBCs, blood group antigens can be found on leukocytes, certain tissues, plasma proteins, platelets, and various cell surface enzymes.[10] Blood group antigens can also be present in body fluids such as sweat, saliva, breast milk, seminal fluid, urine, gastric secretions, and amniotic fluid with soluble form.[11,12] In the years 1960 and 1970, large epidemiological studies were carried out around the world and connections between the human ABO blood group and vulnerability to develop a number of diseases were broadly postulated.[13]

ABO and Rhesus (Rh) blood group systems till today remain clinically most important in spite of being identification of around Twentynine blood group systems, enumerated by International Society of Blood Transfusion. In 1900, Karl Landsteiner detected the human ABO blood group.[14] The Rh blood group system was discovered during 1939–1940 by Landsteiner, Weiner, Levine and Stetson, clarifying the basis of many unpredicted transfusion reactions. In 1945, Coombs, Mourant and Race described the use of antihuman globulin (Coombs test) for incomplete antibodies.[15] Blood group antigens can also be applied in genetic research, forensic pathology, anthropology and ancestral evolution of human.[16] Nowadays, the ABO blood groups display an extensive geographical variation and vary noticeably both within and among ethnic groups. Hence, the knowledge of blood group distribution in diverse populace is of importance in health care and transfusion practices.[17]

The risk of ovarian cancer is 40–60% higher in females with non-O blood groups.[18] It is a well-known fact that A blood group is associated with increased risk of gastric cancer.[19] Severe malaria is more common among children with B blood group in southwest Nigeria.[20] Likewise, blood hemoglobin values also differ among individuals. These variations are due to

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age, sex, race, occupation, socioeconomic status, and various diseased conditions. Women have 12% less Hb levels when compared with age-matched men.[21] The level of hemoglobin and severity of anemia can be assessed by the hemoglobin levels of an individual and have been recommended by WHO according to age and severity.

WHO classification of anemia according to gender and severity

Population	**Non-Anemia**	**Mild Anemia**	**Moderate Anemia**	**Severe Anemia**
Male (> 15 Years)	≥ 13	11-12.9	8-10.9	<8
Non-Pregnant Female (> 15 Years)	≥ 12	11.11.9	8-10.9	<8

There are few older studies which have reported the higher incidence of hemolytic anemia in certain blood groups. Pernicious anemia is commoner in A blood groups males and females.[22]

Anemia during adolescence severely impairs the physical and mental development; weakens behavioral and cognitive development; reduces physical fitness; decreases the work performance and even contributes to the adverse pregnancy outcome Mild anemia can adversely affect the productivity and is also known to reduce the immune-competence.

Aims and Objectives

A study to know whetherthere is any relation between ABOblood groups andoccurrence ofanemia according tosex andin different age groups among the randomly selected population

Methodology

The present Prospective study was conductedon 342 patient (males and females) who are in age groups of 18- 74 years in the Department of Pathology,G. S. Medical College and Hospital Pilkhuwa, Hapur, India for a period of2month after taking the approval of the protocol review committee and institutional ethics committee. Blood sample is taken under aseptic conditions. Blood group is determined using glass slide method using antisera A, B and D.

Inclusion criteria

342 patients (males and females) who are in age groups of 18- 74 years.

Exclusion criteria

Patientswith acute or chronic infections and Pregnant women.

Methodology

A total of 342 patients (males and females) who are in age groups of 18- 74 years, were include in this study. The blood was transferred into prepared Ethylene-diamine Tetra-acetic Acid (EDTA) anticoagulant vial. The ABO and Rhesus blood grouping were done using the glassslide method. A drop of blood from each patient 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. Total erythrocytes count and hemoglobin weredeterminedby using 5-part cell counter namedMindrey. The criteria for detecting anemia were diagnosed as per WHO guidelines.

RESULTS

Atotalof 342 randomly selectedpatients were included in this study. This consisted of59 males and 283femalesbetween the ages of18-74.

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In our study[Table1] shows that themost frequently occurringblood group wasB (37.4 %)followed by O (27.3%), A (23.1%) andAB (12.2%) respectively.[Table2] shows that among the ABOblood groups 94.7%are Rh positive and 5.3 are Rh negative. The distribution of ABO and Rh blood groups among the whole populationisrepresented by[Figure 1] andshows thatB+ve(35.1%) was the most common followed by O+ve(26%) A+(21.6%) AB+(12%) blood group , B- (2.3%), A-(1.5%)and AB−ve, with around 0.3% prevalence, was the least of all blood groups. On the basis of WHO criteria for anemia severity of anemia inbothmales and females arepredominantlyanemia was moderate (59.9%) followed by mild (20.5%) andsevere (19.6%)represented inTable-4and Figure-3.Among the femalesfrequency of anemia is more atageof25-34(26.9%)followed by35-44 (19.6%), 18-24(16.4%) 45-54(11.4%) and least at age of 65-74(3.5%), while In comparison thefrequency of anemia in malesis more at the age of 45-54 (4.4%) followed by 55-65(3.3%) 18-22 (1.7%)and leastat the age of 65-74 (2%) as similar to females.In our study we found that inboth males and femalesblood group B (37.4%) was more prone for anemia followed byO(27.3%), A (23.1%) and AB (12.2.%).

Table 1: Gender – wise distribution of ABO Blood group

Blood groups	Males (n=59)	Percentage (%)	Females (n=283)	Percentage (%)	Total (n=342)	Percentage (%)
A	15	4.4	64	18.7	79	23.1
B	22	6.4	106	31	128	37.4
AB	4	1.2	38	11	42	12.2
O	18	5.3	75	22	93	27.3
Total	59	17.3	283	82.7	342	100

Table 2: Gender– wise distribution of Rh Blood group

Blood Groups	Rh Groups			Rh Groups			Total Rh Groups				Total n=342	%
	Male			Female			Total Rh +	%	Total Rh-	%		
	Rh+	Rh-	Total	Rh+	Rh-	Total						
A	12	3	15	62	2	64	74	21.6	5	1.5	79	23.1
B	21	1	22	99	7	106	120	35.1	8	2.3	128	37.4
AB	4	0	4	37	1	38	41	12	1	0.3	42	12.2
O	17	1	18	72	3	75	89	26	4	1.2	93	27.3
Total	54	5	59	270	13	283	324	94.7	18	5.3	342	100

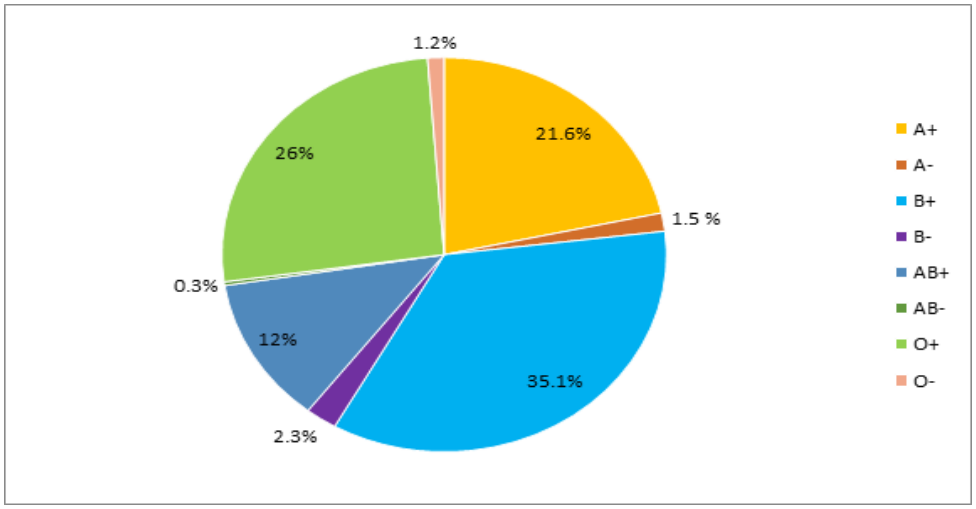

Figure 2: Percentage distribution of various blood groups among the selected population (n = 342)

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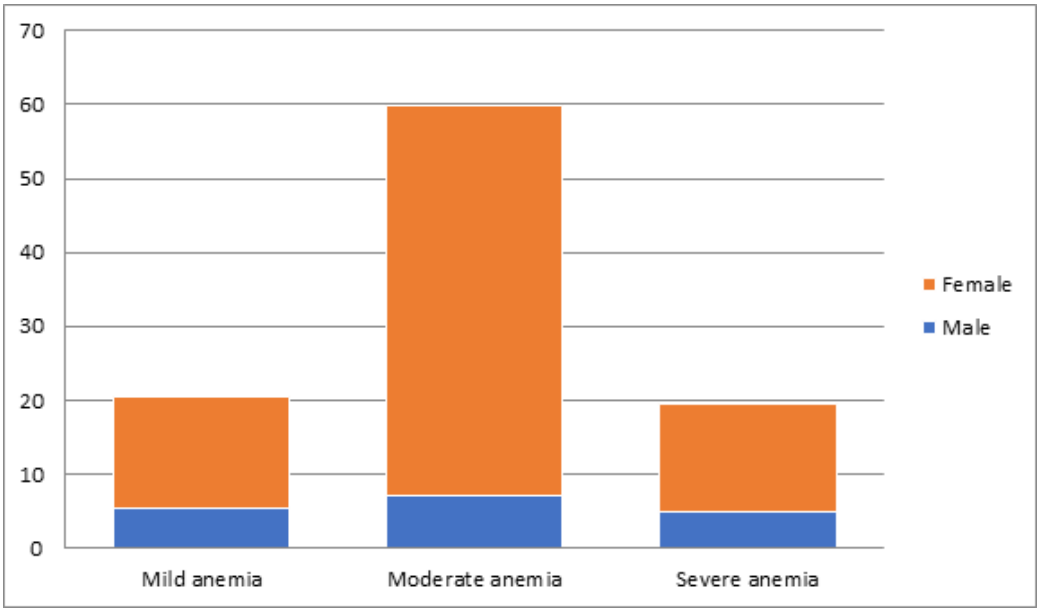

Figure 3: Gender- wise frequency of distribution of anemia among the selected population (n=342)

Table-4:Gender – wise prevalence of anemia.

Anemia	Male	Percentage (%)	Female	Percentage (%)	Total	Percentage (%)
Mild	18	5.3	52	15.2	70	20.5
Moderate	24	7	181	52.9	205	59.9
Severe	17	5	50	14.6	67	19.6
Total	59	17.3	283	82.7	342	100

Table5:- Age and Gender– wise prevalence of anemia.

Agegroups	Male					Female					Total	
	Mild	Moderate	Severe	Total	%	Mild	Moderate	Severe	Total	%	n=342	%
18-24	4	1	1	6	1.8	7	31	18	56	16.4	62	18.1
25-34	0	3	0	3	0.9	13	64	15	92	26.9	95	27.7
35-44	3	9	5	17	5	17	46	4	67	19.5	84	24.6
45-54	3	3	9	15	4.4	5	27	7	39	11.4	54	15.8
55-65	4	5	2	11	3.2	5	6	6	17	5	28	8.2
65-74	4	3	0	7	2	5	7	0	12	3.5	19	5.6
Total	18	24	17	59	17.3	52	181	50	283	82.7	342	100

Table6:ABOblood groups and Gender– wise prevalence of anemia.

Bloodgroups	Male					Female					Total	
	Mild	Moderate	Severe	Total	%	Mild	Moderate	Severe	Total	%	n=342	%
A	11	4	0	15	4.4	14	40	10	64	18.7	79	23.1
B	4	14	4	22	6.4	16	72	18	106	31	128	37.4
AB	0	2	2	4	1.2	10	23	5	38	11	42	12.2
O	3	4	11	18	5.3	12	46	17	75	22	93	27.3
Total	18	24	17	59	17.3	52	181	50	283	82.7	342	100

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DISCUSSION

The study was done on 342 individuals including males (59) and females (283). In our study, the distribution of blood group B was the highest with a percentage frequency of 37.4%, followed by blood group O and A with a percentage frequency of 27.3 and 23.1% respectively and the least percentage frequency is that of blood group AB which is 12.2%. The frequency of Rh+ve was about 94.7%, while 5.3% were Rh-ve in our study. On further evaluating the distribution of subjects according to blood groups and their relationship to anemia it was found that anemia was more frequent in blood group B (37.4%) followed by blood group O (27.3%), A (23.1%) and least in the blood group AB (12.2%)The same trend of prevalence of blood groups (B>O>A>AB) was observed and reported by study conducted by Kaur M.[23].Similar Studies also done at Surat by Nidhi Mehta et al,[24] and Giri et al,[25] at Maharashtra, showed blood group B as the commonest followed by O, A and AB. The frequencies of ABO and rhesus blood groups vary from one population to another. Available literature indicates that over 99% Asian are Rh positive. but amongour study. 94.7% were Rh +ve and 5.3% Rh –ve. It is close to the findings of Parmanik and Parmanik(26). from Nepalese students, in Nepal medical college, Kathmandu. Their subjects were 96.66% Rh+ve and 3.33% Rh –ve.

Thestudyconducted among 120 Nepalese medical students of Nepal Medical college, Jorpati, Kathmandu has found that 34% are blood group A, 29% group B, 4% group AB and 32.5% group O. The frequency of Rh-negative blood are 3.33% and Rh-positive 96.66%.[27] In the Caucasians in the United States, the distribution is group O, 47%, group A, 41%, group B, 9% and group AB, 3%.[28] Similarly, in Pakistan, blood group O is the most common (35%), blood group A is 24%, blood group B is 33% and blood group AB is 8%. In Lagos Nigeria, blood group O is 55.3%, blood group A, 25.3%, blood group B, 16.7% and blood group AB, 2.7%.[29] Thus, the segregation of the genes responsible for the ABO blood groups has always taken a particular pattern for its distribution. In this study Thus, the frequencies of ABO and rhesus blood groups vary from one population to another.

CONCLUSION

This study is thereby an attempt to explore any relationship between blood group antigens and anemia considering the aforementioned facts. This study reveals that there is strong correlation between blood group and anemia.

We conclude that individuals with blood group B are more prone to anemia followed by blood group O, A and least is with blood group AB. Based on their blood groups, we can advice regular intake of diet rich in iron and vitamins or also their supplements to the individual who are more susceptible to anemia. Rhesus positive was commoner than Rhesus negative. The individuals with blood group antigen alpha and beta are comparatively more prone to be anemic, whereas the individuals devoid of these antigens are resistant to anemia.

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