



Correlation Of Hemoglobin with Blood Group in Young Adults of Dehradun

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Abstract

Background- There are very few studies reported in blood hemoglobin level among Individual of different blood groups. There are few older studies which have reported that pernicious anemia is commoner in A blood group.

Aim and Objective- The aim of the study is to find the mean hemoglobin value in different blood groups and find out significant difference in hemoglobin of different blood group.

Material and method- The study was conducted on 200 medical students of age 18-25 years in which 85 were males and 115 were females. Blood hemoglobin estimated by Sahil's Hemoglobinometer. Blood group was determined by using antisera.

Result- The most prevalent blood group in our study was B+ve followed by O+ve, A+ve and AB+ve blood group. Rh+ve and Rh-ve distribution was 95.5% and 4.5%. The highest hemoglobin concentration (14.53 ± 0.29) was falling in Rh-ve blood group as compared to Rh+ve blood group and on comparison it was found statically significant ($p < 0.05$). On comparison of hemoglobin value between different blood group O v/s AB and A v/s AB was found statistically significant ($p \leq 0.05^*$) while between other blood groups it was not significant.

Conclusion- our study shows significant difference of hemoglobin value between blood group O v/s AB and A v/s AB. Knowing the distribution of blood group and hemoglobin value is useful in health care planning, blood transfusion, also useful to find out the type of anemia in particular blood groups and other medical demands.

Keywords: Hemoglobin, blood group, anemia

INTRODUCTION

Hemoglobin is the iron containing oxygen transport metalloprotein in the red blood cells (1). The concentration of which provides information about the status of anemia in the population (2). The values of hematological parameters are affected by a number of factors even in apparently healthy populations. These factors include age, sex, ethnic background, body build and social, nutritional and environmental factors (1). When the level of hemoglobin is low it results in many symptoms like fatigue, weakness and poor defense system (3). Any person whose hemoglobin level is below 12mg / 100mL blood is considered anemic with expectation of pregnant women (1).

It affects mostly preschool children, adolescents and pregnant women. There are about 1.2 billion adolescents in the world, which is equal to 1/5th of the world's population and their numbers are increasing. Out of these, 5 million adolescents are living in developing countries. India's population has crossed the 1 billion marks, out of which 21% are adolescents (4).

The sex differences in hemoglobin level in adults are well documented, and the underlying mechanisms are probably a direct effect of sex hormones, both estrogen and androgens on erythropoiesis. "In pre-pubertal humans no major differences can be found between the sexes in red blood cell count or

hemoglobin and serum ferritin concentrations". "The difference in hematological variables between sexes emerges after onset of menstruations and persistent until 10 yr after the menopause". Menstruation and nutritional intake are principal reasons for lower values of hemoglobin and iron of women regarding men (5).

Many studies conducted to date have focused on the association of the Hb level with BMI or obesity. Several studies have suggested that anemia and the Hb level are related to an increased BMI. Obesity is characterized with chronic, low-grade, systemic inflammation, associated with anemia of chronic disease, elevated serum ferritin and low serum iron, and Hb. A study confirmed that normal-weight children were half as likely to be iron deficient as that of overweight children (2).

Anemia in adolescent is generally more prevalent in the developing countries like India, and boys are less vulnerable than girls (2).

There are many causes of anaemia including iron deficiency as a direct result low iron intake or poor iron absorption, increased blood loss due to menstruation, parasitic infections, acute and chronic infections such as malaria, cancer, and HIV (6).

There are several studies reported on the association between blood groups and hemoglobin phenotypes. For example, HbAS pattern was observed in about 27% of the population in a Nigerian study. However, there are very few studies which have reported the difference in blood hemoglobin levels among individuals of different blood groups. There are few older studies which have reported the higher incidence of hemolytic anemia in certain blood groups (7).

There are 33 blood group recognized by the international society of blood transfusion. The major blood group are A, B, AB and O with Rh positive or negative (7). The membrane of the human red blood cell (RBC) is complex and contains a variety of blood group antigens, the most clinically significant being the A and B antigens. These antigens are complex oligosaccharides that differ in their terminal sugar. The antibodies against red cell antigens are called agglutinins and individuals are categorized into one of four major ABO blood groups (A, B, AB, or O) according to the presence or absence of A, B, or both

antigens and agglutinins (8). Pernicious anemia is commoner in A blood groups males and females (7). The present study was planned to evaluate the hemoglobin concentration in different blood groups in young adults. The aims of the study was to find out the relationship between hemoglobin level and blood groups.

Material and methods

The research was undertaken in Department of Physiology, Shri Guru Ram Rai Medical college, Dehradun, India. The research was conducted in 200 MBBS students between the age of 18-25 years. The subjects were divided into 4 subgroups, based on blood group.

Blood group A (n=54)

Blood group B (n=72)

Blood group O (n= 57)

Blood group AB (n=17)

Subject selection criteria-

All subject age were between 18-25years.

All subjects were physically and mentally fit. All subjects were made familiar with method and equipment prior to test performed.

Measurement of hemoglobin

The hemoglobin content of the participants was in gm/dl by using Sahli's hemoglobinometer (Marienfeld laboratory glassware). Taking N/10 HCl up to the mark of 20% in the graduated tube with the help of dropper. Get the blood drop by bold prick on ring finger under all aseptic condition. Then, the blood sucked up to the mark of 20 cmm in hemoglobin pipette and blow this blood into the graduated tube containing N/10 HCl. Allowing the tube to stand for 10 min and compare the color of content of the tube with the comparator, by adding distilled water drop by drop. Hemoglobin measured in g/dl.

Measurement of blood group

Blood was collected by finger prick method. The procedure was done under all aseptic condition. Blood group of the individual was checked by slide method using antisera A, B, and D. Few drops of blood were mixed with normal saline (NaCl) by the use of toothpick to get a suspension of red cells. 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 3 slide and mixed well with three different toothpicks and wait for 10 min. After 10 min, the slide were observed for agglutination and the blood group were determined accordingly.

Data was transferred to Microsoft Excel sheet. The blood hemoglobin values of different blood groups were tabulated.

Statistical analysis was done by using Student's T-Test.

Observation and result

From this study the distribution of subjects according to blood groups were A⁺(25%), A⁻(2%), B⁺(35%), B⁻(1%), O⁺(27.5%), O⁻(1%), AB⁺(8%), AB⁻(0.5%) (figure 1) and we observed that Rh+ve subjects were

higher than Rh -ve (figure 2). The mean hemoglobin concentration of each blood group shows in Table 1. On the comparison of hemoglobin concentration of different blood groups, we observed that Rh-ve blood group has higher hemoglobin (14.53±0.29 gm/dl) level as compare to Rh+ve (13.39±0.09 gm/dl) (table 2) blood group and also Blood Group B-ve has highest mean hemoglobin value (15 gm/dl) and AB⁺ has least level of hemoglobin (12.73±0.30).

Further comparison between Hb values of the different blood group was done (table 3). There is statistically significant value found in Hb values between the blood groups O v/s AB and A v/s AB while blood group B v/s O, B v/s A, B v/s AB, O v/s A were not significant.

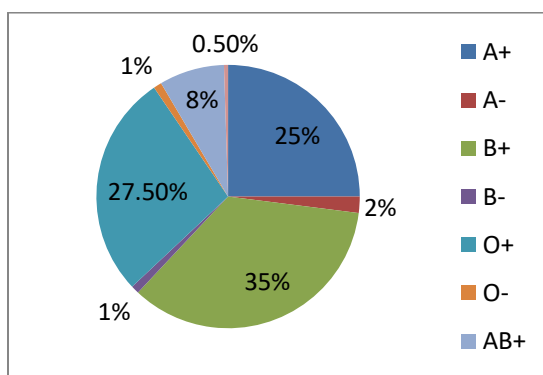


Figure 1. ABO Blood group distribution of all subjects.

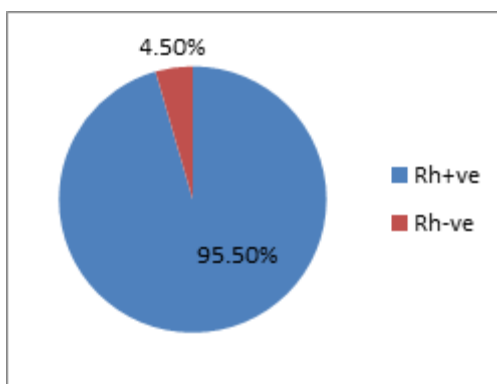


Figure 2. Rh blood group distribution of all Subjects

ABO group	Blood	Hb concentration
		(gm/dl)
A ⁺		13.48 ± 0.17
A ⁻		14.45 ± 0.06
B ⁺		13.45 ± 0.18
B ⁻		15
O ⁺		13.42 ± 0.16
O ⁻		14.5 ± 0.5
AB ⁺		12.73 ± 0.30
AB ⁻		14

Table 1. Hb concentration of different

Rh blood Group		P value
Rh +ve	13.39±0.09	<0.05*
Rh -ve	14.53±0.29	

Table 2. Comparison of Hb concentration between Rh +ve and Rh –ve Blood group

Blood group		P value
Blood group B	B v/s O	0.9
	B v/s A	0.9
	B v/s AB	0.07
Blood group O	O v/s A	0.7
	O v/s AB	0.05*
Blood group A	A v/s AB	0.02*

Table 3. Comparison of Hb value between different blood groups

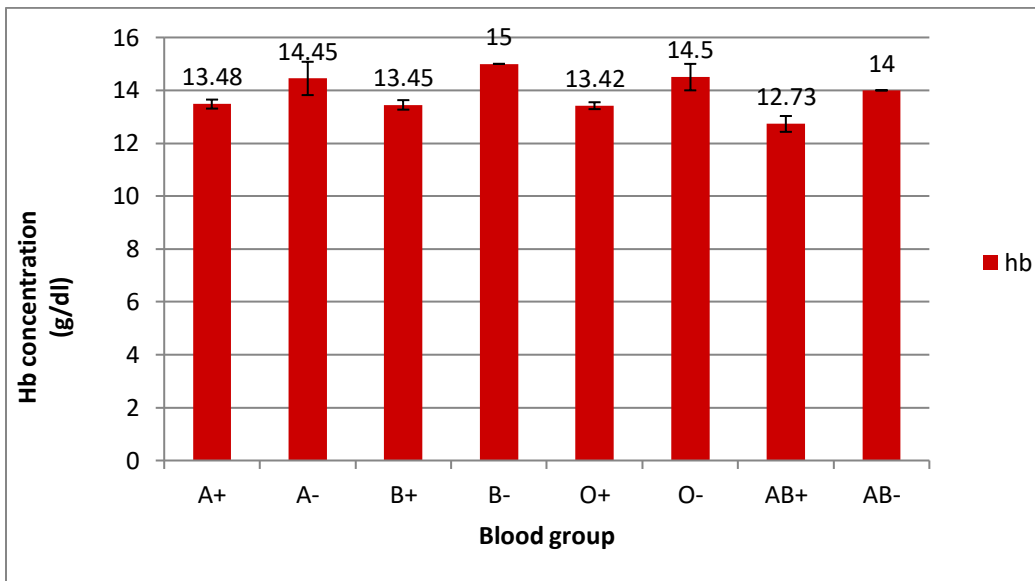


Figure 3. Histogram showing Hb concentration in different blood groups.

Discussion –

The study was conducted on 200 students. The present study pointed that blood group B and O was common in distribution followed by A and AB blood group. There are several factors such as genetic and environmental factor on variation of blood group frequency in different part of the world (9). On the comparison of hemoglobin concentration of Rh blood groups, we observed that Rh-ve blood group has

higher hemoglobin (14.53±0.29 gm/dl) level as compare to Rh+ve (13.39±0.09 gm/dl) blood group and Blood Group B-ve has highest mean hemoglobin value (15 gm/dl) and AB+ has least level of hemoglobin (12.73±0.30). Banik SD (2008) also found B blood group individual have higher mean hemoglobin value than other blood groups (10).

Further comparison between Hb values of the ABO blood group was found statistically significant value

found in Hb values between the blood groups O v/s AB and A v/s AB while blood group B v/s O, B v/s A, B v/s AB, O v/s A were not significant. Ramalingam (2020) also found highly significant value but between different blood group O v/s A and no significant value found with other blood groups (7). Mahapatra et.al (2019) found blood group showed no association with hemoglobin level (11). Similar to all their studies, our study also did not show significant relationship between hemoglobin values and blood groups except blood group O v/s AB and A v/s AB.

There could be racial, and regional differences in the hemoglobin values in the individuals and this could be the reason why we have different results of mean hemoglobin values in different blood groups in our selected population. Fluctuations in Hb levels and its association with comorbid conditions overtime are also observed with different type of blood groups. Blood hemoglobin values differ among individuals. These variations are due to age, sex, race, occupation, socioeconomic status, and various diseased conditions. Genes encoding RBC enzymes and membranes can also cause genetic variations in hemoglobin concentrations(7).

Conclusion –

The present study conclude that On comparison of hemoglobin values in ABO blood group, blood group O v/s AB was significant($p=0.05^*$) and A v/s AB was highly significant ($p<0.05^*$) while blood group B v/s O, B v/s A, B v/s AB, O v/s A were not significant. On the other hand, comparison of hemoglobin values in Rh+ve and Rh-ve individual was found statically significant. Knowing the distribution of blood groups and hemoglobin values is useful in health care planning, allocation of resources. The blood group prone to anaemia could be determined and targeting the population that need counseling. If such information is well managed it can make a difference in the quality of decision that individuals will make especially as it concerns marriage, blood transfusion and other medical demands.

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