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## Study of Blood Group and its Relation with Bleeding and Clotting Time

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### Abstract

**BACKGROUND** Haemostasis is the process of clot formation in the damaged vessel wall that prevents further blood loss and conserves blood in the fluid state within the circulatory system. It is an essential factor to keep in mind before performing any type of surgical process.

**AIM** The study aimed to assess blood group distribution, clotting, and bleeding time.

**METHODS** The study was conducted in the physiology department at Manav Rachna Dental College. Data is available for 54 students in the BDS 1st year. Information about the student includes sex, ABO and Rh blood groupings, bleeding time, and clotting time. Standard antiserum A, B, and D were used to determine the blood group. For the determination of bleeding time, Duke's method was used. The capillary glass tube method was used for determining clotting time. At last, all the parameters are combined and compared for statistical analysis of the relation with the blood Haemostasis as parameter like bleeding time and Clotting time.

**RESULTS** In the analysis, a significant level of 0.05 was employed for the one-way ANOVA, indicating the threshold for statistical significance. In terms of mean bleeding time, blood group AB exhibited the highest value, followed by blood groups O and A, with blood group B demonstrating the lowest mean bleeding time. Clotting time was found to be highest in blood group A, followed by O, B, and AB in contrast to a study showing higher clotting time in B followed by O, A and AB<sup>[10]</sup>. Kaur M et al, conducted a study showing that BT was prolonged in O blood group followed by B, AB and lowest in A<sup>[11]</sup>, while in our studies it was highest in blood group AB then O followed by B and A. Both bleeding time and clotting time showed no significant difference with respect to blood grouping.

**CONCLUSION** The study at Manav Rachna Dental College assessed blood group distribution, clotting, and bleeding time among 54 BDS 1st year students. Data was collected using standard antiserum A, B, and D, Duke's method for bleeding time, and capillary glass tube method for clotting time. The results showed that blood group AB had the highest mean bleeding time, followed by O and A, while blood group B had the lowest. Clotting time was highest in blood group A, followed by O, B, and AB.

**Keywords:** Blood group, bleeding time, clotting time,

### INTRODUCTION

Haematological studies of humans are used in the diagnosis of many diseases. Some initial clinical diagnostic parameters are bleeding time, clotting time and blood grouping.<sup>p</sup> A variety of blood group-specific antigens, also known as agglutinogens are present on the membranes of human RBC. These antigens enable the blood groups of different individuals to be differentiated<sup>[1]</sup>. Blood grouping tests are frequently used in blood transfusion processes, in pregnancy for Rh compatibility<sup>[2]</sup>. In preparation to give the transfusion it is mandatory to determine the blood group of both the recipient and the

donor so that the blood can be properly matched it is called blood typing.<sup>3</sup> Formalized paraphrase Studies show that the blood grouping system is associated with many clinical disorders like thalassemia. In addition, ABO blood group antigens can be altered by hematological cancers that can modify the sugar chains that bear the ABO blood group antigens, leading to the use of the A and B antigens as tumor markers for acute leukemia, myeloproliferative disorders, and myelodysplasia diabetes mellitus, ulcers, and cancers<sup>[4,5]</sup>.

Recent studies have associated COVID-19 with different ABO blood group by using a meta-analysis method. It states that the blood groups A, B and AB are associated with an increase in the risk of COVID-19 infection in comparison with the O blood group, which seems to be protective<sup>[6]</sup>. In conditions like epistaxis, thrombosis and surgery these parameters are important for diagnosis. The time interval between the dermis puncture and the spontaneous arrest of bleeding under the physiological process is concluded as bleeding time. It indicates the rate of platelet adhesion, aggregation, and haemostatic plug formation<sup>[3]</sup>. The bleeding time depends greatly on the seriousness of wound and the degree of blood flow in the finger tip or ear lobe at the time of the test.<sup>[6]</sup> Platelet defects can cause prolonged bleeding. In thrombocytopenia and thrombasthenia, it is prolonged<sup>[7]</sup>. The time taken between blood vessel rupture and fibrin thread formation is concluded as clotting time. The blood clotting mechanism is important for the prevention of bleeding by physiological processes. The absence of any of the 12 clotting factors can cause hemorrhagic or bleeding disorders. The study's objective was to determine how individuals from various blood groups reacted in terms of bleeding and clotting times, as well as how these factors related to gender<sup>[7,8]</sup>.

Agglutinogens are blood group-specific antigens which are present on the membrane of human RBC's. These antigens enable the blood groups of different individuals to be differentiated. Blood grouping tests are frequently used in blood transfusion processes, in pregnancy for Rh compatibility, and for investigating cases of paternity disputes. Finding out the recipient's and the donor's blood type before administering a transfusion to a patient is important so that blood can be properly matched. Blood matching and blood typing are two names for this procedure<sup>[3]</sup>. Formalized paraphrase Studies show that the blood grouping system is associated with many physiological disorders like diabetes mellitus, ulcers, and cancers<sup>[4]</sup>.

#### **Methods and Materials: Data Collection and Project Design**

The study took place in Faridabad at the School of Dental Science, which is part of Manav Rachna University. A group of 53 first-year undergraduate students both male and female, aged between 18 to 22 years from the Dental Branch actively participated in all the experiments that were conducted.

#### **BLOOD GROUP**

The determination of blood groups was done by standard antisera in the physiology laboratory during physiology practical time. The procedure is based on the principle of agglutination. The red cell suspension was prepared by pricking the finger under aseptic precautions. A grease-free glass slide was used for the antigen-antibody reaction. On different glass slides, the blood sample was mixed individually with antisera A, B, and D. Subsequently, the slide underwent examination to ascertain if agglutination was observed or not. A low-power microscope can be used to confirm the finding.

#### **Bleeding time**

Due to its convenience, Duke's method was chosen for determining bleeding time, as it is widely considered the most suitable approach. A deep skin puncture in the fingertip is made using a sterile pricking needle and time of puncture is noted as "zero time." A clean piece of filter paper is used for drying the escaping blood by touching the edge of the paper to the drop of blood after every thirty seconds. By multiplying the total count of blood droplets on the filter paper with either 30 seconds or half a minute, one can ascertain the bleeding time for the given sample. Typically, the normal bleeding time using this method falls within the range of 1 to 5 minutes<sup>[8]</sup>.

#### **Clotting method**

In order to determine the clotting time, the capillary glass tube method was employed, wherein a blood sample was obtained by performing a deep skin puncture on the tip of any of the middle three fingers using a sterile pricking needle, and the initial drop was subsequently wiped away. The capillary tube filled with blood sample is held in the palm to maintain it at a normal body temperature. The tube was broken off about 9 cm from one end, after waiting for one or two minutes. Notice a fibrin thread forming a bridge between the two broken ends of the tube. Every 30 seconds, the procedure is repeated until a fibrin thread becomes visible. The clotting time is calculated based on the total time taken from the puncture to the formation of the fibrin thread. In normal conditions at 37°C, the clotting time using this technique ranges between 2 and 8 minutes<sup>[8]</sup>.

#### **DATA COLLECTION**

The experiments were conducted between April 10 and June 20. A pre-designed questionnaire was used for collecting information like their age, gender, blood group, bleeding time and clotting time from students.

**RESULT**

Table 1: Frequency distribution of students by sex, ABO type, and Rh type

Groups	Subgroups	Frequency	Percentage
Sex	Males	14	26.4
	Females	39	73.6
ABO type	A	12	22.6
	B	29	54.7
	AB	2	3.8
Rhesus type	O	10	18.9
	Positive	51	96.2
	Negative	2	3.8

Table 2: Comparison of bleeding time and clotting time according to blood groups

Blood grouping	BT (seconds)	CT (seconds)
	Mean +S.D.	Mean +S.D
A	210.0+61.35	222.5+37.2
B	198.6+48.38	211.03+32.55
AB	255.0+21.21	210.0+42.42
O	234.0+48.57	219.0+37.55
p-value	0.175 (NS)	0.776 (NS)

In the analysis, a significant level of 0.05 was employed for the one-way ANOVA, indicating the threshold for statistical significance. In terms of mean bleeding time, blood group AB exhibited the highest value, followed by blood groups O and A, with blood group B demonstrating the lowest mean bleeding time. Clotting time was found to be highest in blood group A, followed by O, B, and AB in

contrast to a study showing higher clotting time in B followed by O, A and AB<sup>[10]</sup>. Kaur M et al, conducted a study showing that BT was prolonged in O blood group followed by B, AB and lowest in A<sup>[11]</sup>, while in our studies it was highest in blood group AB then O followed by B and A. Both bleeding time and clotting time showed no significant difference with respect to blood grouping.

Table 3: Comparison of bleeding time and clotting time according to gender

Gender	Bleeding Time (seconds) ,Mean +S D	Clotting Time (seconds) Mean +S.D.	p-value
Females	214.62+52.20	212.31+32.56	0.288 (NS)
Males	197.14+52.25	222.85+38.51	0.327 (NS)

A significance level of 0.05 was used in the independent t-test, indicating statistical significance.

In contrast to an older study<sup>[12]</sup> showing both bleeding time and clotting time higher in females than males our studies

shows that females had only bleeding time higher as compared to males, while clotting times were found to be longer in males as compared to females. However, the difference was not significant for both BT and CT.

Table 4: Comparison of bleeding time and clotting time according to Rh type

Blood grouping	BT (seconds)	CT (seconds)
	Mean +S.D.	Mean +S.D.
Positive	208.23+51.75	214.71+34.66
Negative	255.0+63.64	225.0+21.2
p-value	0.218 (NS)	0.680 (NS)

Independent t-test was used, with a p-value of 0.05 considered significant.

Rh-negative individuals exhibited longer clotting time and bleeding time compared to Rh-positive individuals, although the observed disparity did not reach statistical significance. The Pearson correlation between bleeding

time and clotting time was highly significant. A direct relationship was observed between bleeding time and clotting time. ( $r = 0.429$ ,  $p = 0.008$ ).

**DISCUSSION**

In our study Females students showed higher bleeding times as compared to males students, while clotting times were found to be longer in males as compared to females. Studies show that Caucasian individuals suffering from epistaxis, was observed that around 50 patients out of 100 had blood group O, whereas, in the control groups, this proportion was lower, with only 45 out of 100 having the same blood type. According to many studies, the risk chances of thromboembolism is less in people with O blood group than those who have A, B, AB blood groups<sup>[13]</sup>. The reason may be a high level of some factors like Willebrand and factor VII in individuals with blood groups A, B, AB. Several other studies suggest that the ABO blood group has an impact on the level of plasma VWF<sup>[14]</sup>.

Reeta et al, conducted a study<sup>[12]</sup> at Guahati Medical College, which revealed that males had lower bleeding time and clotting time compared to females. Female with O blood group are more liable to suffer from some disease like epistaxis and thrombosis.

## CONCLUSION

In the current study, 54 students between the ages of 17 and 24 participated, of whom 30 were female and 14 were male. In our study Blood group B was the found to be the most common blood group and AB was the least common that differ from the result found in the study conducted by Rupali et al showing O as the most common blood group and AB as the least<sup>[15]</sup>. Blood group emerged as the study's predominant female blood type, with bleeding times significantly longer in females than males and clotting times significantly longer in males than. Due to the presence of oestrogens, females experience an increase in bleeding time as a result of reduced platelet function. According to different research, both bleeding time and clotting time are longer in females than males, but interestingly, our study findings are different from other studies in that males have a longer clotting time than females. Based on our findings, it has been observed that blood group AB is associated with an extended bleeding time, while blood group A shows a prolonged clotting time.

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