Original Article

Analysis of bleeding time and clotting time with ABO blood group among healthy adults: a cross-sectional study

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Abstract

Background: Bleeding time (BT), clotting time (CT) and blood grouping are routinely done in physiology laboratory as part of haematology experiments. BT, CT and blood grouping are essential for surgeons and anesthetists prior to do any surgical procedure because of their association with hemostasis.

Objective: To determine the BT and CT and analyze their association with ABO blood group among healthy adults.

Methods: This cross-sectional study was conducted in the department of Physiology, Dhaka Medical College, Dhaka from July 2016 to June 2017. The study included 150 healthy subjects, who were 1st year MBBS students from 18 – 21 years' age group. After taking the informed consent bleeding time, clotting time and blood grouping of the subjects were determined. All collected data were documented in a prefixed questionnaire. Data analysis was done by SPSS (Statistical Package for Social Sciences) Version 22. Comparison between blood groups and BT, CT and their association was done by unpaired Students t-test.

Results: In this study mean age of the study subjects was 19.50 ± 0.82 years and 71(47.3%) were male & female were 79 (52.7%). Majority of the subjects had blood group B 57(38%) followed by O group 49(32.7%). The mean (±SD) bleeding time was 2.95 ± 1.00 minutes. The mean clotting time was 6.82 ± 0.85 minutes. BT and CT of blood group A was 2.53 ± 0.72 minutes & 6.52 ± 0.72 mintes, blood group B was 2.53 ± 0.90 minutes & 6.41 ± 0.51 minutes, blood group O was 3.85 ± 0.55 minutes & 7.58 ± 0.80 minutes and blood group AB was 2.20 ± 1.39 minutes & 6.33 ± 0.52 minutes. Statistically significant differences ($p \leq 0.001$) were observed among the bleeding and clotting time of O blood group with other blood groups (A, B and AB).

Conclusion: Blood group B is most common among the study subjects. Bleeding time and clotting time are significantly higher in O blood group than other blood groups (A, B, AB). Blood grouping, bleeding time & clotting time is mandatory before any surgical procedures because of their association with thrombosis & epistaxis.

Keywords: Bleeding time, Clotting time, Blood grouping, Medical students.

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Introduction:

Bleeding time is the time between the puncture of the blood vessel to the stoppage of bleeding. Normal bleeding time is 3 to 4 minutes. Bleeding time is affected by platelet function and activation, aggregation and coagulation. Bleeding time is increased in thrombocytopenia, disseminated intravascular coagulation (DIC) and also in Bernard-Soulier disease which is a rare autosomal recessive disorder. Clotting time is the time between the puncture of the blood vessel to the formation of the fibrin thread. Normal clotting time is 5 to 8 minutes. Clotting time is affected by clotting factors. Defect or absence of any clotting factor causes increase in clotting time.[1,2]

Determination of hematological parameters like bleeding time, clotting time and blood grouping is essential for surgeons and anesthetists prior to do any surgical procedure. Correlation of these parameters like BT, CT and blood grouping is important in case of epistaxis, thrombosis etc. Some studies have found that epistaxis in blood group O is more common as compared to other ABO blood groups.[3,4]

According to some researchers, the ABO blood group system influences the bleeding time and clotting time. They stated that vWF gene have been influenced by gene locus of ABO blood group on chromosome 9q34.[5,6] Person with blood group O has longer bleeding and clotting time compared to other ABO blood groups because of lower expression of Von Willebrand factor (VWF) in them. These individuals with O blood group have lower plasma VWF level due to faster hepatic clearance leading to shorter plasma half-life of VWF.[7] Von Willebrand factor is a large glycoprotein which is synthesized by Weibel-Palade bodies in the endothelial cells and alpha granules of megakaryocytes.[8] It is involved in hemostasis. Von Willebrand factor has two major roles in hemostasis. First, it helps in platelet adhesion and platelet aggregation. Second, VWF is the specific carrier of factor VIII (Anti-Hemophilic factor) in plasma. It protects factor VIII from proteolytic degradation and prolonging its half-life in circulation. Thus, effectively localizing it at the site of vascular injury .[9] So, the aim of this study was to determine the BT and CT and analyze their association with ABO blood group among healthy adults.

Materials & Methods:

TThis cross-sectional study was conducted in the Department of Physiology, Dhaka Medical College, Dhaka from July 2016 to June 2017. The study was conducted on 150 healthy subjects who were 1st year MBBS students with 18 – 21 years' age group. Bleeding time, clotting time and blood grouping were determined after taking informed consent from them. Statistical analysis was done by student's unpaired t test. ANOVA and Post Hoc test was done for assessing relationship between BT, CT and blood groups. Ethical clearance was taken from Research Review Committee and Ethical Review Committee of Dhaka Medical College, Dhaka. Study subjects were selected on the basis of inclusion criteria like age-group from 18-21 years, both sex and students with normal BMI. Exclusion criteria included: history of bleeding and clotting disorder, history of taking drugs that may influence bleeding/clotting time, eg; Warferin, Aspirin, Clopidogrel or NSAID, rare blood groups, suffering from any acute or chronic disease, abnormal BMI and h/o abnormal function of liver.

Study procedure

After selection of the subjects, the nature, purpose and benefit of the study was explained to each subject in details. They were encouraged for voluntary participation. They were allowed to withdraw from the study whenever they feel like. Informed written consent was taken from the participants. Before collecting blood sample, detailed family and medical history was taken. Anthropometric measurements of the subjects were done and blood pressure was measured. All the information's was recorded in a prefixed questionnaire. Blood grouping, bleeding time and clotting time were done in Department of Physiology, Dhaka Medical College, Dhaka. Height and weight were recorded in centimeter (cm) & in kilogram (kg). Body mass index of the subjects was calculated from measured height and weight using standard formula. BMI = Weight in kg/ Height in m². For data analysis SPSS (Statistical Package for Social Sciences) Version 22 was used. Results were presented as mean ± standard deviation (mean ± SD). Comparison between two groups was done by unpaired Students t-test, where applicable p value <0.05 was accepted as level of significance.

Results:

This study was conducted on 150 1st year medical students who were in 18-21 years' age group. Male was 71(47.3%) and female was 79(52.7%).

Table 1: General characteristics of the study subjects (n=150)

Parameters	Mean±SD	Range (min-max)
Age (years)	19.50 ± 0.82	18.00- 21.00
Height (cm)	161.46 ± 8.68	148.00- 179.50
Weight (kg)	59.25 ± 11.57	33.50- 96.00
BMI (kg/m^2)	20.69 ± 3.86	18.13- 24.73

Table 1 shows the age range of the study subjects was 18-20 years. The mean (± SD) age of the study group was 19.50±0.82 years. The mean (±SD) height of the study group was 161.46 ± 8.68 cm. The mean (±SD) weight of study subjects was 59.25±11.57 kg. The mean (± SD) BMI of the study group was 20.69 ± 3.86 kg/m2. All the values were within normal range.

Table 2: Blood group distribution of the subjects (n=150)

Blood group	No. of subjects	Percentage
A	38	25.3
B	57	38.0
O	49	32.7
AB	06	4.0
Total	150	100

Table 2 shows majority 57(38%)of the subjects had blood group B, followed by O group 49(32.7%), A group 38(25.3%). Only 6(4%) were in AB group.

Table 3: Bleeding time and clotting time of the subjects (n=150)

Parameters	Mean±SD	Range (min-max)
Bleeding time (min)	2.95 ± 1.00	1.00-4.30
Clotting time (min)	6.82 ± 0.85	6.00- 10.00

Mean bleeding time was 2.95 ± 1.00 minutes and mean clotting time was 6.82 ± 0.85 minutes as shown in Table 3.

Table 4: Bleeding and clotting time of the study subjects in different blood groups (n=150)

Blood group	Bleeding time (min.)	Clotting time (min.)
A (n=38)	2.53 ± 0.72	6.52 ± 0.72
B (n=57)	2.53 ± 0.90	6.41 ± 0.51
O (n=49)	3.85 ± 0.55	7.58 ± 0.80
AB (n=6)	2.20 ± 1.39	6.33 ± 0.52

Table 4 shows that the blood group O was found to have bleeding time 3.85 ± 0.55 minutes and that of clotting time were 7.58 ± 0.80 minutes. The blood group B had bleeding time 2.53± 0.90 minutes and that of clotting time was 6.41 ± 0.51 minutes, blood group A had bleeding time 2.53± 0.72 minutes and that of clotting time was 6.52 ± 0.72minutes, AB blood group had bleeding time 2.20± 1.39 minutes and that of clotting time was 6.33 ± 0.52 minutes.

Table 5: Statistical analysis between BT, CT and different blood groups

Blood groups	*p* value	
	Bleeding time	Clotting time
A vs B	0.996	0.366
A vs O	<0.001	<0.001
A vs AB	0.365	0.542
B vs O	<0.001	<0.001
B vs AB	0.415	0.737
O vs AB	<0.001	<0.001

Table 5 shows statistically significant differences ($p \leq 0.001$) among the bleeding and clotting time of O blood group with other blood groups (A, B and AB).

Discussion:

The present study was undertaken to observe blood group distribution and its relationship with bleeding time and clotting time. For this study, a total number of 150 male and female students with age ranging from 18 to 21 years were considered. In the study group, height and weight were measured to calculate their body mass index (BMI). Blood group was determined to observe its distribution. Bleeding time and clotting time were estimated to see its relationship with blood group.

In the present study, all the parameters in adult healthy subjects were within reference value, similar findings were observed by the various investigators from different countries .[2,1,10,11] In this study, age and BMI of all the subjects were almost similar (Table-1). The blood group B was most common in study subjects (Table 2). This finding agreed with the study of many researchers of different country.[10,12,13] On the contrary, Akhter et al., Mridha and Jena found different distribution among blood groups. This disagreement in findings might have occurred due to racial and geographical variation. [11,14]

In the present study, the mean BT and the mean CT were longer in blood group O (Table-4). Almost similar types of results of bleeding time and clotting time in blood group O were found by many researchers.[1,2,10-12] However, some researchers found prolonged bleeding time in blood group B and blood group AB .[15,16,17,8] This dissimilarity might be due to variation in plasma vWF level which was genetically determined. On the other hand, a study showed that CT was longer in blood group B.[18] Prolonged CT in AB blood group was also found.[15] These findings might have occurred due to variation of plasma vWF in different race. Here, in this study, statistically significant differences ($p \leq 0.001$) among the bleeding and clotting time of O blood group with other blood groups (A, B and AB) were found (Table-5). Similar finding was found only in case of clotting time where it was statistically significant only between group O & group A, with higher value in group O but in bleeding time no statistical significance was found.[19] In a study, bleeding time of >4 minutes was found in both O and B group but the result was not statistically significant (p=0.85) & clotting time of >6 minutes was found again in both O and B groups and no statistical difference was found (p=0.96).[20] Clotting time was found more in blood group AB and bleeding time in blood group B than other blood groups which was statistically significant.[16]

In this study the sample size was less, so further research should be performed with larger sample size. Analysis with other blood group system may also necessary because we only considered ABO blood group. Plasma vWF levels should be estimated to rule out any reasons for the difference clotting and bleeding time among ABO blood groups. Further studies can be conducted using other test method such as estimation of prothrombin time, activated partial thromboplastin time and determination of coagulation factor which should give more accurate results.

Conclusion:

After analyzing the results of our study, it is concluded that blood grouping, bleeding time & clotting time is mandatory before any surgical procedures because of their association with thrombosis & epistaxis. Blood group B is most common among the study subjects. Bleeding time and clotting time are significantly higher in O blood group than other blood groups (A, B, AB). This study will help to bring awareness among the individuals about their inherited risk of bleeding tendency.

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