

Correlation of Bleeding Time and Clotting Time with ABO Blood Groups: An Observational Study Among Medical Students

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Received: 24-05-2021 / Revised: 19-06-2021 / Accepted: 07-07-2021

Abstract

Background: Bleeding time (BT), clotting time (CT) and blood grouping are routinely done as a part of haematology experiments in physiology labs. In hospitals, BT, CT and blood grouping are done in diseases like thrombosis and epistaxis before surgery. Haemostasis is important for surgeons and anaesthetist. Many studies have been done on the association of blood groups with different diseases. But there are less number of studies on association of blood groups with BT, CT. **Aims and Objectives:** The main aim of the study was to assess the relationship of BT and CT with different ABO blood groups. **Materials and Methods:** This study was carried out in the department of physiology, VIMS, Ballari. This study was done on 200 students of VIMS. Blood group determination was performed by mixing blood sample with antisera A, B and antisera Anti D. Bleeding time was determined by Duke method and clotting time was estimated using Wright's Capillary tube method. Chi-Square analysis was used to determine relationship of BT, CT with different ABO blood groups. **Results:** Results of this study showed that blood group O (37%) was more predominant, followed by blood groups B (30.5%), A (23.5%) and AB (9%). Bleeding time was found to be prolonged > 3 minutes in AB blood group (37.5%) followed by group O (25%), A (25%) and B (12.5%) and was statistically significant (p=0.03). Clotting time > 4 minutes is found to be more in blood group O (46.67%), followed by A (33.33%), B (13.33%) and AB (6.67%), but this variation was statistically insignificant. CT > 4 minutes was found to be in 60% of females compared to 40% in males and was statistically significant (p=0.04). Whereas BT > 3 minutes was statistically insignificant in between males and females. **Conclusion:** Our study reports that, blood group O was the most common group and AB was the least common group. BT was prolonged in AB blood group, while CT was prolonged in O blood group. CT was found to be more in females than males.

Keywords: Bleeding Time, Clotting Time, Blood Groups.

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Introduction

Karl Landsteiner discovered the ABO blood group in 1900 which led to starting of blood banks and blood transfusions[1]. ABO blood grouping is based on antigenic property of red blood cells. Type A individuals have the A antigen, type B have antigen B, type AB have both and type O have neither of these. These A and B antigens are complex oligosaccharides present on the surfaces of red blood cells that differ in their terminal sugars[2]. A and B glycosyltransferase converts H antigen into A and B determinants. This transferase enzyme is deficient in the group O persons who continue to express H antigen[3].

Research suggests that epistaxis is more often encountered in patients having blood group 'O' due to lower expression of Von Willebrand factor[4-6]. Data from few other researches has shown that ABO blood groups are associated with duodenal ulcer, gastric carcinoma, diabetes mellitus, urinary tract infections and venous thrombosis[7-11]. Haemostasis is the spontaneous arrest of bleeding from injured capillaries and vessels which includes vasoconstriction, platelet plug formation, clot retraction, clot lysis[12].

BT is defined as the time interval between start of bleeding and the stoppage of bleeding due to formation of temporary platelet plug. BT usually lasts of 3 to 4 minutes[13]. BT is affected by platelet function. CT is the time interval between onset of bleeding to formation of first fibrin thread. Normal CT value is 5 to 8 minutes. CT is affected by clotting factors. Defect of clotting factors or absence of them leads to prolonged CT[14]. As mentioned, ABO blood groups are associated with many diseases. This study was conducted to know the relationship of different ABO blood groups with BT and CT in students of VIMS, Ballari.

Objectives

1. To determine the blood group of the subjects in this study.
2. To determine the BT and CT of the subjects.
3. To find out the relationship of blood groups with BT and CT.

Materials and methods

This cross-sectional study was conducted in the Physiology Department of VIMS, Ballari. This study was approved by the institutional ethical committee.

Inclusion and Exclusion Criteria

After obtaining informed consent, 200 medical and dental students in the age group of 17 to 20 years were selected for the study. Those students with history of bleeding and clotting disorders, drug intake (non-steroidal anti-inflammatory drugs) and smokers were excluded from the study.

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Determination of Blood group

The samples of the blood samples were collected in our physiology lab by finger prick under aseptic conditions and red cell suspension was prepared by mixing blood and normal saline. The red cell suspension was mixed with antisera anti-A, anti-B, covered it with Petri dish for 8 min. Subsequently, blood groups were determined on the basis of the presence or the absence of agglutination. Confirmation of agglutination was decided by observing under low-power objective of a compound microscope[15].

Determination of BT

It was done by Duke's filter paper method. In this method, deep finger prick was made with lancet under aseptic conditions. The length of time required for bleeding to stop was recorded by blotting the drop of blood coming out of the incision every 30 seconds using blotting paper. Further, BT was computed by multiplying the number of blood spots on the filter paper with 30 seconds. The normal range of BT done by Duke's filter paper method is in the range of 1-5 min[15].

Determination of CT

This was determined by Wright's capillary glass tube method. In this method, using aseptic precautions finger prick was made in the skin and the blood was taken into a capillary glass tube. The length of time taken for the blood to clot was calculated by breaking the capillary tube after 1 min, 1 cm from one end every 30 seconds till appearance of fibrin thread. In this method normal clotting time is 3-6 min[15].

Statistical Analysis

Statistical Analysis was carried out using SPSS version 24. To examine the relationship between blood groups and BT CT, chi square analysis was applied, p-value < 0.05 was considered to be statistically significant.

Results

A total of 200 students in the age group of 17 to 20 years participated in this study. Out of 200 students, 128 were males and 72 were females. After analyzing the data, results showed that blood group O was more predominant, followed by blood groups B, A and AB. The percentage distribution of ABO blood groups was found to be O (37%) > B (30.5%) > A (23.5%) > AB (9%) as shown in table 1.

The distribution of BT and CT in correlation to blood groups is presented in table 2. As per table 2, BT more than 3 minutes is found more in blood group AB (37.5%) followed by group O (25%), A (25%) and B (12.5%). The chi square test of the data shows statistically significant difference (p=0.03). Table 2 also shows CT of more than 4 minutes is more in blood group O (46.67%), followed by A (33.33%), B (13.33%) and AB (6.67%). However, chi square test does not show statistically significant result (p = 0.433).

In the table 3, gender wise comparison has been presented. It shows that BT is prolonged in males compared to females whereas CT was more prolonged in females. As per table 3, BT is > 3 minutes in 87.5 males compared to 12.5% in females but was statistically insignificant (p=0.157). Table 3 also shows that CT is > 4 minutes in 60% of females compared to 40% in males and is statistically significant (p=0.04).

Table 1: Gender-wise distribution of ABO blood group

Gender	A	B	AB	O	Total
Male	32 (16%)	37 (18.5%)	10 (5%)	49 (24.5)	128 (64%)
Female	15 (7.5%)	24 (12%)	8 (4%)	25 (12.5)	72 (36%)
Total	47 (23.5%)	61 (30.5%)	18 (9%)	74 (37%)	200

Table 2: Distribution of bleeding time and clotting time among ABO blood group with Chi-square analysis

Variables	Time (minutes)	A	B	AB	O	Total (Percentage)	p Value
Bleeding Time	<= 3	45 (23.43%)	60 (31.25%)	15 (7.81%)	72 (37.5%)	192 (96%)	0.03
	>3	2 (25%)	1 (12.5%)	3 (37.5%)	2 (25%)	8 (4%)	
Clotting Time	<= 4	42 (22.70%)	59 (31.89%)	17 (9.19%)	67 (36.21%)	185 (92.5%)	0.43
	> 4	5 (33.33%)	2 (13.33%)	1 (6.67%)	7 (46.67%)	15 (7.5%)	

Table 3: Gender-wise distribution of clotting time and bleeding time with Chi-square analysis

Variables	Bleeding Time		Clotting Time	
	<= 3	> 3	<= 4	> 4
Male	121 (63.02%)	7 (87.5%)	122 (65.95%)	6 (40%)
Female	71 (36.98%)	1 (12.5%)	63 (34.05%)	9 (60%)
p value	0.157		0.04	

Discussion

This study was carried out with 200 students in the age group 17-20 years. In this study, it was found out that the predominant blood group was blood group O (37%) followed by blood group B (30.5%), A (23.5%), and AB (9%). Most of students having more than 3 min bleeding time was found in AB blood group in comparison to other groups of ABO system and it was statistically significant (p = 0.03). Similarly, most of students with more than 4 min clotting time was in O blood group in comparison to other groups of ABO system but this was statistically insignificant (p = 0.43). Clotting time is found to be prolonged in females in comparison to males and is statistically significant (p = 0.04).

The results of our study revealed the prevalence of ABO blood groups were O>B>A>AB. Similar result was found in the studies of different researchers about the prevalence of ABO blood groups [16-20, 29]. On the other hand, the results of our study differed with other researchers results that reported the predominance group is B followed by O>A>AB[21-24].

As per Franchini et al the non-O group individuals have more chance of developing thrombosis in comparison to the O group individuals because of the presence of more vWF in non-O group individuals[30]. In another study by Jenkins and O'Donnell, non-O group individuals have 25% more vWF in comparison to group O individuals, meaning BT, CT will be more in O group individuals in comparison to non-O group[25].

According to our study, BT > 3 minutes was found to be prolonged in AB blood group compared to other ABO blood groups and was statistically significant. Similar results of prolonged BT in blood group AB were reported by other studies[17,18]. Our study showed contradictory results to certain other studies, where O blood group was found to be more prolonged compared to other groups and was statistically insignificant[16,22,26,27]. While results of Mirdha and Jena showed that BT is prolonged in O blood group and is significant statistically[20].

In our study, CT > 4 minutes was prolonged in blood group O followed by A, B and AB. However, it was statistically insignificant. Similar results were seen in the work of Mirdha and Jena where CT

was prolonged for blood group O but was statistically significant[20]. However, some studies reported different results to our study, that is prolonged CT in blood group B followed by O, AB, and A, which was not statistically significant[16,22,27]. In other works CT was prolonged in blood group B followed by O, AB, A but was statistically significant[17,19].

The results of gender wise comparison in our studies showed that CT is prolonged in females when compared to males and is statistically significant, but BT values were statistically insignificant. Some studies reported that both BT and CT are prolonged in females as compared to males and the variation was statistically significant[19,20,23,28,29,32]. In another study, it was reported that there was no variation of BT and CT between the genders[17]. As per the study conducted by Ercan et al, female individuals may have more bleeding time and clotting time because of the presence of hormone estrogen, that lowers the plasma level of fibrinogen and increase the clotting time[31].

This study was conducted with 200 sample size; further research can be taken up with increased sample size and by measuring plasma vWF levels to rule out any reasons for the different bleeding time and clotting time among ABO blood groups.

Conclusion

Our study reports that, blood group O was the most common group and AB was the least common group. It was also observed that most of subjects having more than 3 min bleeding time was found in AB blood group in comparison to other groups of ABO system and was statistically significant, while CT more than 4 minutes was found to be more among blood group O in comparison to other groups of ABO system but was statistically insignificant. Gender wise CT was higher in females than in males and is statistically significant.

Acknowledgments

Authors would like to sincerely thank the director, principal and HOD of physiology dept, VIMS for their support and students for their participation.

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Conflict of Interest: Nil Source of support: Nil