



Association of ABO Blood Groups with Bleeding Time and Clotting Time among MBBS Students: A Cross-Sectional Observational Study

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ABSTRACT

Blood Group in human is completely & unchangeable identity. Blood group antigens are genetically determined and are inherited as Mendelian determinants. The relationship between ABO blood group and are associate with various diseases for example gastric cancer periodontal disease and Venus thrombosis. Some author found that epistaxis is commonly seen in people with O blood due to there is a low expression of Von Willebrand factor (vWf) causing a relative bleeding tendency. Haemostasias refers to the natural physiological mechanism that prevents and stops bleeding, thereby maintaining vascular integrity. The objective of the study was to assess the relationship between bleeding time and clotting time among various blood groups and to identify any gender difference among the same.

Our study included 300 MBBS students (180 males and 120 females) in the age group of 17–21 years. The blood grouping was carried out with the standard antisera, and bleeding time and clotting time were estimated by Duke method and capillary glass tube method respectively. Finally, bleeding time and clotting time of different blood groups were compared and statistical analysis was carried out.

Results: Blood group O was the most common blood group in both genders followed by B, A, and AB. Bleeding time in relation with blood group was found to be statistically insignificant. Also, clotting time in relation within blood group was found to be statistically non-significant. Similarly, gender-wise bleeding time in relation with blood group was found to be statistically insignificant. Also, clotting time in relation within blood group was found to be statistically non-significant and clotting time was also statistically insignificant.

Keywords: Blood Group, Bleeding Time (BT), Clotting Time (CT), von Willebrand factor (vWf)

INTRODUCTION

Blood Group in human is completely & unchangeable identity. Blood group antigens are genetically determined and are inherited as Mendelian determinants [1]. The ABO blood group antigens appear to have been important throughout our evolution because the frequencies of different blood types vary among different populations [2].

Type A individuals have the antigen A, type B have antigen B, and type AB have both; type O have neither of these antigens. These A and B antigens are complex oligosaccharides present on the surface of red blood cells that differ in their terminal sugar [3].

Recent research data shows that ABO blood group are associate with various diseases for example gastric cancer periodontal disease and Venus thrombosis [4,5]

Some authors have found that epistaxis is commonly seen in people with O blood group when a compared with other ABO Blood group and they also observe that there is a low expression of Von Willebrand factor (vWf) causing a relative bleeding tendency [6,7].

vWf is a blood glycoprotein involved in haemostasis, synthesized by endothelial cells and megakaryocytes. It helps in platelet adhesion and platelet aggregation. It also acts as a special carrier protein for the clotting factor

VIII (anti-homophilic factor A). Thus, vWf plays an important role in formation of temporary haemostatic plug and its conversion into definite clot by activation of clotting mechanism [3].

Therefore, the ABO blood group system influences the bleeding time (BT) and clotting time (CT). BT is the time interval between the skin puncture and spontaneous unassisted stoppage of bleeding. CT is the time interval between the puncture between the puncture of blood vessels and formation of fibrin threads [3]. Thus, relationship between BT, CT, and blood groups is important in certain clinical conditions such as epistaxis, cardiac surgery or thrombosis.

According to Mourant [9], and Qureshi and Bhatti, [10] there is a clear association between ABO blood group status and vWf. Deficiency of vWf leads to haemorrhagic disorders, whereas elevated levels are a risk factor for thrombosis [11]. As per the study conducted by Gill et al [12] group O individuals had lowest plasma vWF levels and A, B, and AB had elevated levels of plasma vWF. They state that there is increased thrombotic risk among the A, B, and AB individuals. This refers to increased BT and CT among O group compared to the A, B, and AB group individuals. At the same time Daniel et al. [13] in their study, could not find any association between ABO group and vWf.

Hence, this study was conducted to find out any existence of relationship between the different ABO blood groups with bleeding time and clotting time, and also to identify any gender difference among the same.

Aims and Objectives

1. To determine the blood group of the subjects in this study
2. To determine the BT and CT of the study subjects.
3. To assess the relationship between BT and CT among various blood groups and also to identify any gender difference among the same.

MATERIALS AND METHODS

This cross-sectional observational study was conducted at Government Medical College, Gondia, Maharashtra, over a four-month period from October 2024 – January 2025. A total of 300 MBBS students aged 17–21 years, including 180 males and 120 females, participated voluntarily. Ethical clearance was granted by the Institutional Ethics Committee, and informed written consent was obtained from each participant.

To minimize hormonal variation among females, testing was done during the follicular phase (days 5–10) of the menstrual cycle. Students with known bleeding disorders, current infections, or those on medications such as anticoagulants [3] or hormonal contraceptives were excluded.

Blood grouping was determined during practical time in physiology laboratory by standard antisera. Blood samples were collected by finger prick with sterile lancet after cleaning the puncture site with spirit. Blood grouping was conducted using the glass slide agglutination method. This technique involves a drop of the subject's blood and NaCl is taken on each clean glass slide and then placing a drop of antisera-A, antisera-B and mixed with separate sticks and to look for agglutination of RBCs under the microscope. If the blood sample forms agglutination with antisera A it is blood group A, with antisera B its blood group B, agglutination seen in both its blood group AB, while no agglutination in both its O blood group [14].

BT was determined by Duke's filter paper method. A deep skin puncture was made and the length of time required for bleeding to stop was recorded by blotting the drop of blood coming out of the incision every 30 sec using blotting paper. BT was calculated by multiplying the number of drops on the filter paper and 30 sec. The normal BT by Duke's filter paper method is usually in the range of 2–6 minutes [14].

CT was determined by capillary tube method. A deep puncture was made in the skin and the blood was taken in to a capillary glass tube. The length of time taken for the blood to clot was calculated by breaking the capillary

tube after 2min,1–2cm from one end every 30sec till appearance of fibrin thread. The normal CT estimated by this method falls in the range of 3–8 minutes [14].

Data were analyzed using SPSS version 25. Statistical comparisons were made using chi- square test. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1. Distributions in ABO blood group according to sex.

Blood group	Males	Females	Total	p value
Group A	45 (25 %)	31 (25.84%)	76 (25.33%)	$\chi^2 = 0.214$ $df = 3$ $p = 0.975$
Group B	53 (29.44%)	34 (28.34%)	87 (29%)	
Group AB	17 (09.44%)	13 (10.84%)	30 (10%)	
Group O	65 (36.12%)	42 (35%)	107 (35.67%)	
Total	180	120	300	

The distribution of ABO blood groups according to gender was analysed using the Chi-square test of independence. No statistically significant association was observed between gender and blood group. Thus, ABO blood group distribution was comparable between males and females in the study population.

Table 2. Distribution of Bleeding time in relationship to blood group

	Bleeding Time			
Blood group	1-2 min	2 - 4 min	Total	p value
A	16	60	76	$\chi^2 = 3.009$ $df = 3$ $p = 0.390$
B	15	72	87	
AB	9	21	30	
O	18	89	107	
Total	58	242	300	NS

Interpretation - A Chi-square test comparing mean bleeding time among blood groups. Showing $p > 0.05$, so there is no statistically significance difference in mean bleeding time among blood groups A, B, O and AB.

Table No. 3. Distribution of clotting time in relationship to blood group

Clotting time				p value
Blood group	2-3 min	3 - 6 min	Total	$\chi^2 = 2.055$ $df = 3$
A	4	72	76	
B	3	84	87	



AB	3	27	30	p = 0.561 Significance level > 0.05
O	5	102	107	
TOTAL	15	285	300	

Also, A Chi-square test comparing mean clotting time among blood groups. Showing $p > 0.05$, there was no statistically significant association between blood group and clotting-time.

Table 4. Distribution of bleeding time according to sex and blood group

BLEEDING TIME							
	Male		FEMALE		TOTAL		
Blood Group	1-2 min	2 - 4 min	1-2 min	2 - 4 min	1-2 min	2 - 4 min	
A	9	36	7	24	16	60	$\chi^2 = 0.004$ df = 1 p = 0.952
B	9	44	6	28	15	72	
AB	6	11	3	10	9	21	
O	11	54	7	35	18	89	
TOTAL	35	145	23	97	58	242	

Similarly, no statistically significant difference in bleeding-time category was observed between male and female participants.

Table 5. Distribution of clotting time according to sex and blood group

CLOTING TIME							
	Male		FEMALE		TOTAL		
Blood Group	2-3 min	3 - 6 min	2-3 min	3 - 6 min	2-3 min	3 - 6 min	
A	3	42	1	30	4	72	$\chi^2 = 2.055$ df = 3 p = 0.561
B	2	51	1	33	3	84	
AB	2	15	1	12	3	27	
O	3	62	2	40	5	102	
TOTAL	10	170	5	115	15	285	

There was no statistically significant association between ABO blood group and clotting-time category among males and females.

In the overall study population, the association was also not statistically significant. Thus, bleeding time and clotting time in relation with ABO blood group did not differ significantly.

DISCUSSION

In this study conducted on 300 students, the percentage distribution of blood groups showed predominance of blood group O (35.67%) followed by B (29%), A (25.337%), and AB (10%). In India, same prevalence of ABO blood group has been reported, which is in line with Asiatic trend of prevalence of blood groups $O > B > A > AB$ has been reported by many research study [1,7,15,16]. Contrary to our study, other researcher found that prevalence of blood groups $B > O > A > AB$ was observed in various research studies [17,18].

Several studies have been carried out so far to correlate the association between blood groups and the Bleeding time and clotting time. According to the review article written by Franchini et al.,[8] when compared to the type O group, the A, B and AB (non-O) group individuals can have an increased risk of thrombosis due to the higher levels of vWf. The authors also stated that the ABO group can affect the vWF catabolism, which means that the plasma vWF levels may depend on blood group of the individual. This concept was accepted by other studies conducted by Jenkins and O'Donnell [20] who stated that vWf is 25% more in non-O group individuals compared to group O individuals. This means that the bleeding time and clotting time will be elevated among the O group individuals compared to the other groups.

In our study found that bleeding time was not statistically significant. Similar nonsignificant prolonged Bleeding time was seen in blood group O in other studies also [3,7, 17,21] Contrary to our study, BT was found more prolonged in the blood group AB compared to other groups, which was statistically significant [1,15]

In our study, clotting time was not statistically significant, Similar nonsignificant raised CT was seen in other studies [3, 7,17]. In contrary significant findings were seen in studies carried out by M Kaur [3] and Mahapatra and Mishra[15] and Sasekala and Saikumar[16].

Regarding gender-wise distribution of bleeding time and clotting time, we observed that bleeding time and clotting time was not statistically significant in females as compared to male. Which correlate with study carried out by Mahapatra and Mishra [3, 15]. In contrary with our study statistically significant findings were seen in raised bleeding time and clotting time were seen in females compared to males [16,18].

CONCLUSION

Blood group O is the most common blood group among the students and AB is the least common blood group. Also, there was no statistically significant relation between blood groups, BT, and CT. Gender-wise BT and CT also shows that the difference was statistically insignificant. The statistically insignificant values may be due to the small sample size.

Further research with larger sample size and conduct of multicentric studies are necessary to confirm this finding of different ABO blood groups with different bleeding tendencies and their association with vWf and factor VIII so that preventive measures could be adopted before the onset of such disorders.

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