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ASSOCIATION OF BLEEDING TIME (BT) AND CLOTTING TIME (CT) WITH ABO BLOOD GROUPS IN MBBS STUDENTS OF RANI DURGAVATI MEDICAL COLLEGE, BANDA: A CROSS SECTIONAL STUDY

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Abstract:

Background: Blood group is not only a part of identity but also has a crucial role in the field of transfusion medicine. The relationship between bleeding time, clotting time and blood group is especially relevant in certain clinical conditions like surgery, thrombosis, and epistaxis. Several studies have found variations in bleeding tendencies among different ABO blood groups. Hence this study was done to find the association of bleeding time and clotting time with ABO blood groups.

Objective: To compare the bleeding time and clotting time among various ABO blood groups.

Materials and Methods: 192 MBBS students, between the age group of 17-22 years, of Rani Durgavati Medical College, Banda, Uttar Pradesh, were enrolled after taking written informed consent. Bleeding time was estimated using Duke's method, clotting time using capillary tube method and blood group using standard antisera.

Results: Among 192 students, the most common blood group was B (35%), followed by O (31%), A (21%) and AB (13%). The significance of association of bleeding time and clotting time with ABO blood groups was determined using Kruskal-Wallis test. The test revealed that the distribution of bleeding time and clotting time is same across different ABO blood groups. So, there is no significant association of bleeding time and clotting time with ABO blood groups ($p=0.087$ for BT; $p=0.112$ for CT).

Conclusion: There was no significant association between bleeding time, clotting time and ABO blood groups.

Keywords: bleeding time, clotting time, blood group

INTRODUCTION

Karl Landsteiner was the first to describe the ABO blood group system. It comprises of carbohydrate structures that are expressed on a variety of cells, including red blood cells (RBCs), platelets and endothelial cells (ECs).¹⁻³ These carbohydrate structures, called A, B and H antigens, are terminal sugars at the end of complex glycan chains.⁴ The precursor H glycan structure is converted into A or B antigen by addition of specific sugar residues, catalyzed by either A- or B-glycosyl transferase enzymes respectively. In blood group O, there is no A- or B-transferase activity, and so, H glycan structure is present at the terminal of its oligosaccharide chains.⁴

The significant role of the ABO blood group system in the field of blood transfusion and organ transplantation is widely recognized. Interestingly, there have also been notable connections observed between ABO blood groups and various medical conditions, such as duodenal ulcers, gastric cancer, and several types of infections, including those caused by *Helicobacter pylori*, *Salmonella typhi*, and *Plasmodium falciparum*.^{5,6} Recent research findings indicate that the ABO blood group can affect the chances of having a severe COVID-19 infection.^{7,8} Multiple studies have highlighted that ABO blood type is a significant and separate risk factor for both cardiovascular disease and venous thromboembolism.^{5,9} Furthermore, genome-wide association studies have revealed that the ABO blood group not only serves as a risk factor for atherosclerosis but also plays a crucial role in the development of acute coronary syndrome and heart attacks.^{10,11} Additionally, clinical research has shown that individuals with blood type O experience a significant decrease in both the size of infarct and overall mortality.¹² Although the connection between ABO blood groups and blood coagulation was initially suggested over six decades ago, the specific biological mechanisms responsible for this association are still not well comprehended.¹³

von Willebrand factor (vWf) is a glycoprotein found in the blood that plays a crucial role in hemostasis. It is produced by endothelial cells and megakaryocytes. vWf facilitates platelet adhesion and aggregation, serving as a carrier for clotting factor VIII (also known as anti-hemophilic factor A). Consequently, vWf plays a significant part in the formation of a temporary hemostatic plug and its transformation into a stable blood clot through the activation of the clotting process.¹⁴ As reported by Mourant¹⁵ and Qureshi and Bhatti¹⁶, there is a distinct correlation between ABO blood group and von Willebrand factor (vWf). A deficiency of vWf can result in bleeding disorders, while elevated levels are associated with an increased risk of thrombosis.¹⁷⁻¹⁹ However, in their study, Daniel et al. were unable to identify any link between ABO blood groups and von Willebrand factor (vWf).²⁰ So the aim of this study is to find if there is any relationship between bleeding time (BT), clotting time (CT) and ABO blood groups.

MATERIALS AND METHODS

This cross-sectional study was conducted at Department of Physiology, Rani Durgavati Medical College, Banda. After taking their written informed consent, 192 MBBS students

were included in the study. The participants were in the age group of 17-25 years. Those participants who had a history of bleeding disorders or were on chronic medication like NSAIDs, anti-platelet or anti-coagulant drugs, were excluded from the study. This study was approved by the Institutional Ethics Committee.

Blood group was determined by slide agglutination method using standard antisera. Blood was collected by giving a deep bold prick on the skin using pricking needle, while maintaining all aseptic precautions. The collected blood was mixed with anti-A, anti-B, and anti-D sera. Presence or absence of agglutination was used to determine the blood group. Agglutination was confirmed using light microscope under low power.

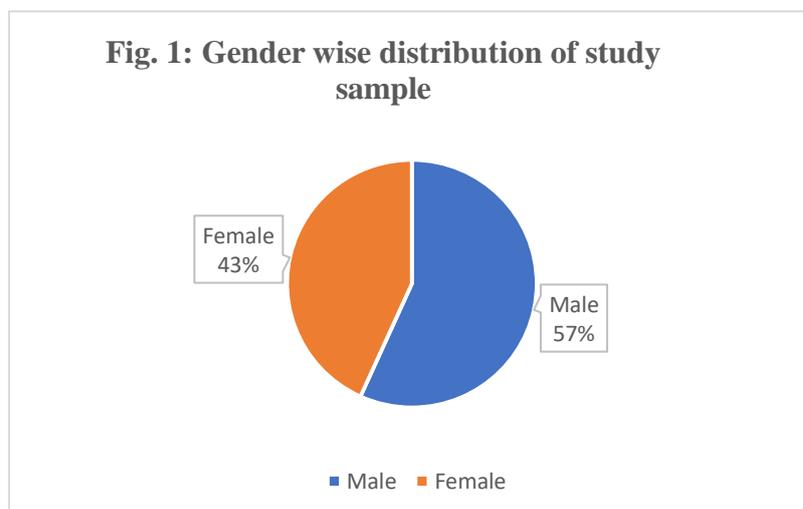
Bleeding time (BT) was determined using Duke's filter paper method. A deep bold prick was given on the skin using pricking needle, under all aseptic precautions. Blood coming out was blotted on the filter paper, every 30 seconds. Bleeding time was calculated as time from pricking to spontaneous stoppage of bleeding.

Clotting time (CT) was determined using capillary tube method. A deep bold prick was given on the skin using pricking needle, under all aseptic precautions. Blood coming out was collected in a capillary tube. After 2 minutes, 1-2 cm piece of capillary tube was sequentially broken every 30 seconds till appearance of fibrin thread. Clotting time was calculated as time from pricking to appearance of fibrin clot.

The data was recorded in Microsoft Excel and analyzed using IBM SPSS Statistics 25. $P < 0.05$ was considered statistically significant.

RESULTS

The data for all 192 participants was analyzed. Of 192 students, 109 (57%) were male and rest 83 (43%) were female (Figure 1). Table I shows that, among males, the most common blood group was O (36%) followed by B (30%), A (22%) and AB (12%); while among females, the most predominant blood group was B (41%), followed by O (25%), A (19%) and AB (15%). Overall, most common blood group was B (35%), followed by O (31%), A (21%)



and AB (13%).

Blood group	Male (%)	Female (%)	Total (%)
A	24 (22)	16 (19)	40 (21)
B	33 (30)	34 (41)	67 (35)
AB	13 (12)	12 (15)	25 (13)
O	39 (36)	21 (25)	60 (31)

The data for bleeding time and clotting time does not follow normal distribution, as confirmed by Shapiro-Wilk test (Table II). The median BT among females was 90 s, with minimum BT being 30 s and maximum being 250 s, giving a range of 220 s. Among males, the median BT was 120 s, with minimum being 30 s and maximum 300 s, giving a range of 270 s (Table III). Overall, median BT was 120 s, with minimum being 30 s and maximum 300 s, giving a range of 270 s (Table IV). The median CT among females was 240 s, with 75

				Kolmogorov-Smirnov ^a		Shapiro-Wilk			
				Statistic	df	Sig.	Statistic	df	Sig.
Bleeding Time (sec)				.157	192	.000	.949	192	.000
Clotting	.163	192	.000	.929	192	.000			
Time (sec)									

a. Lilliefors Significance Correction

s as minimum and 600 s as maximum, giving a range of 525 s. Among males, median CT was 210 s, with minimum being 90 s and maximum 510 s, giving a range of 420 s (Table III). Overall, median CT was 225 s, with minimum being 75 s and maximum 600 s, giving a range of 525 s (Table IV).

	Gender		Statistic
Bleeding Time (sec)	F	Median	90
		Minimum	30
		Maximum	250
		Range	220

	M	Median	120
		Minimum	30
		Maximum	300
		Range	270
Clotting Time (sec)	F	Median	240
		Minimum	75
		Maximum	600
		Range	525
	M	Median	210
		Minimum	90
		Maximum	510
		Range	420

Table IV: Descriptives		
		Statistic
Bleeding Time (sec)	Median	120
	Minimum	30
	Maximum	300
	Range	270
Clotting Time (sec)	Median	225
	Minimum	75
	Maximum	600
	Range	525

The significance of association of bleeding time and clotting time with ABO blood groups was determined using Kruskal-Wallis test. The test reveals that the distribution of bleeding time and clotting time is same across different ABO blood groups. So, there is no significant association of bleeding time and clotting time with ABO blood groups ($p=0.087$ for BT; $p=0.112$ for CT).

The significance of association of bleeding time and clotting time with gender was analyzed using Mann-Whitney U test. The test reveals that the distribution of bleeding time across the two genders is significantly different ($p=0.019$), while the distribution of clotting time across the two gender categories is same ($p=0.523$). So, the bleeding time among male participants appears to be significantly higher than female participants.

DISCUSSION

In the percentage distribution of blood groups of 192 study participants, the most common blood group was B (35%), followed by O (31%), A (21%) and AB (13%). Various other research studies also observed similar trend in the prevalence of blood groups.^{21,22}

Numerous studies have been conducted to explore the connection between blood groups and blood clotting parameters, such as clotting time (CT) and bleeding time (BT). According to a review authored by Franchini et al.¹⁴, individuals with non-O blood groups may face an increased risk of thrombosis because they tend to have higher levels of von Willebrand factor (vWf) compared to those with blood type O. The authors also noted that a person's ABO blood group can influence the breakdown of vWf, suggesting that plasma vWf levels may vary depending on an individual's blood group. This idea has gathered support from other studies conducted by Jenkins and O'Donnell⁵, who reported that non-O blood group individuals have approximately 25% more vWf than those with blood type O. Consequently, CT and BT are likely to be higher in individuals with blood type O compared to those with other blood groups.

In our study also, the BT was higher in individuals with blood group O compared to other groups, but the difference was not statistically significant. Other studies also found such non-significant higher BT in blood group O compared to other blood groups.²³ In contrast to our findings, BT was significantly prolonged in blood group AB compared to other groups.^{24,25}

In our study, CT was also higher in blood group O compared to other groups, but the difference was not statistically significant. However, studies conducted by Mahapatra and Mishra²⁴, as well as Sasekala and Saikumar²⁶, yielded significant results.

While comparing the genders, the BT was found to be higher in males compared to females, and the difference was statistically significant ($p=0.019$). However, the CT was found to be higher in females compared to males, but the difference was not statistically significant. In other studies, there were findings of increased bleeding time (BT) and clotting time (CT) in females when compared to males, and these differences were statistically significant.^{21,26,27} However, Mahapatra and Mishra found no such difference in BT and CT between males and females in their study.²⁴

CONCLUSION

In our study, we did not find any significant association between ABO blood groups and BT & CT. However, some previous studies have found association between ABO blood groups and BT & CT, as discussed above. Also, in our study, the most common blood group found was B, followed by O, A, and AB, which was similar to results of previous studies. However, there is need for further large scale studies to conclude about the association among BT, CT and ABO blood groups.

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CONFLICT OF INTEREST

None

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