Research Article

Distribution of blood group and its relation to bleeding time and clotting time

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Abstract

Background: Blood group and its relation to bleeding time (BT) and clotting time (CT) is important in clinical conditions like epistaxis, thrombosis, and surgery. Earlier studies depicted O group having prolonged BT and CT.

Objectives: The aim of this study was to assess the relationship of BT and CT with ABO groups.

Material and Methods: This cross-sectional study was conducted in the Department of Physiology, Veer Surendra Sai Institute of Medical Sciences and Research. The study included 150 students. Blood grouping was determined with the standard antisera; BT and CT were estimated by the Duke method and Wright's capillary glass tube method, respectively. Blood group and its relation to BT, CT were analyzed by Chi-square analysis.

Results: Blood group O (40.7%) was predominant in both genders followed by B (32.7%), A (18%), AB (8.7%). CT was found to be more than 6 min in group O (31.57%) followed by group AB (26.31%), A and B (21.05%). The difference was statistically significant ($p = 0.02$). BT was found to be more than 4 min in group O (82.35%) followed by A (11.76%), B (5.88%), and AB (0%). That was statistically significant ($p = 0.01$). CT was more than 6 min in 57.89% in females as compared to 42.10% in males, variation was statistically significant ($p = 0.01$). BT was more than 4 min in 58.82% females as compared to 41.17% in males. The variation was statistically significant ($p = 0.03$).

Conclusion: In our study blood group O was more common followed by B, A, and AB. CT and BT were prolonged in O group. BT and CT were more in females than males.

KEY WORDS: Blood group, bleeding time, clotting time

Introduction

Blood group has clinical and medicolegal importance for human life. There are many blood groups and ABO group is of great clinical importance. Scientist Karl Landsteiner discovered the ABO blood group system. In transfusion medicine blood group plays important role. ABO blood grouping is based on antigenic property of red blood cells. The A and B antigens are inherited as Mendelian dominants, on this basis individuals are divided into 4 blood types. Type A individuals have the A antigen, type B have the B antigen, type AB have both, and type O have neither. These A and B antigens are complex oligosaccharides that differ in their terminal sugar.[1] The location of gene coding for these antigens is on chromosomes 9 and 19. [2] Certain diseases are more common in individuals with one blood type or another. Various research data show the association of diseases like duodenal ulcer, gastric carcinoma, diabetes mellitus, urinary tract infection, and venous thrombosis with ABO blood group system.[3–7] Research groups have found that in O blood group epistaxis is more common as compared to other ABO blood groups, may be due to lower expression of von Willebrand factor (vWF) in them.[8]

Blood vessel walls and platelets contain vWF, it helps in platelet adhesion and platelet aggregation, in addition it regulates circulating levels of factor VIII (anti-hemophilic factor A).[1] vWF plays an important role in temporary hemostatic plug formation and activate clotting mechanism that leads to definite clot formation. Hemorrhagic disorders are due to deficiency of vWF while its elevated levels are a risk factor for thrombosis.[9–11] Some researcher stated that other genes like gene locus of ABO blood group on the chromosome 9q34 have influence on the vWF gene.[6]

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Therefore, the ABO blood group system influences the bleeding time (BT) and clotting time (CT) of an individual. BT is the time interval between the skin puncture and spontaneous unassisted stoppage of bleeding, it is mainly test for assessment of platelet function.[12,19] CT is the time interval between the entry of blood into the glass capillary tube and formation of fibrin threads.[12] The relationships between BT, CT, and blood groups have influence in certain clinical conditions such as epistaxis, cardiac surgery, or thrombosis and many more. Thus, this study was proposed to find out the relationship of blood group with BT and CT in young adults.

Material and Methods

The present cross-sectional study was conducted in the Department of Physiology, V.S.S. Institute of Medical Sciences & Research, Burla. Local institutional review board had approved this study.

Inclusion criteria: In total, 150 healthy MBBS students in the age group 17–20 were selected for this study after obtaining their consent.

The exclusion criteria for selection of the students were any history of bleeding and clotting disorders, smokers, and chronic drug user (non-steroidal anti-inflammatory drugs).

Subjects were explained about the purpose and output of study. All experimental procedures were carried out in Hematology Laboratory, Department of Physiology.

Blood group determination: Blood samples were collected by finger prick under aseptic conditions and red cell suspension was prepared with mixing blood and normal saline. The red cell suspension was mixed with antisera anti-A, anti-B, covered it with Petri dish for 8–10 min. Blood groups were determined on the basis of the presence or the absence of agglutination. Conformation of agglutination was by observing under low-power objective of a compound microscope.[12]

BT was determined by Duke's filter paper method. A deep finger prick was made under aseptic conditions 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 s using blotting paper. BT was calculated by multiplying the number of spots on the filter paper and 30 s. The normal BT by Duke's filter paper method is usually in the range of 1–5 min.[12]

CT was determined by Wright's capillary glass tube method. Under aseptic condition 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 s till appearance of fibrin thread. Normal clotting time was 3–6min.[12]

Statistical Analysis

Statistical analysis was carried out using SPSS, version 16. The Chi-square analysis was applied to examine relation between blood groups and BT, CT; *p*-value of <0.05 was considered to be statistically significant.

Results

In the present study, 150 students ranging from the age groups of 17 to 20 years were involved. Out of 150 students, 48 were female and 102 were male. Data were analyzed and results showed that blood group O was more predominant, followed by blood groups B, A, and AB. The order of percentage distribution of ABO groups was O (40.7%), B (32.7%), A (18%), and AB (8.7%) (Table 1). Table 1 also shows that the blood group O (40.7%) was more common followed by blood group B (32.7%), A (18%), and AB (8.7%). Table 1 shows that O group was predominant in both males and females followed by blood group B>A>AB.

The distribution of CT and BT in relation to blood groups is shown in Table 2. Table 2 shows that CT more than 6 min

Table 1: Gender-wise distribution of ABO blood group

Gender	*N* (%)				
	A	B	AB	O	Total
Female	10 (20.83)	13 (27.08)	6 (12.50)	19 (39.58)	48 (32.00)
Male	17 (16.66)	36 (35.29)	7 (6.86)	42 (41.17)	102 (68.00)
Total	27 (18.00)	49 (32.67)	13 (6.67)	61 (40.67)	150 (100.00)

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

Variables	Time (min)	N (%)				P
		A	B	C	O	
Clotting time	<6	23 (17.55)	45 (34.35)	8 (6.1)	55 (41.98)	*0.02*
	>6	4 (21.05)	4 (21.05)	5 (26.31)	6 (31.57)	
Bleeding time	<4	25 (18.79)	48 (36.09)	13 (9.77)	47 (35.33)	*0.01*
	>4	2 (11.76)	1 (5.88)	0 (0)	14 (82.35)	

The distribution is statistically significant ($p < 0.05$).

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

Variables	Clotting time (min)		Bleeding time (min)	
Time	<6	>6	<4	>4
Male	94 (71.75)	8 (42.10)	95 (71.42)	7 (41.17)
Female	37 (28.24)	11 (57.89)	38 (28.57)	10 (58.82)
p	0.01		0.03	

The distribution is statistically significant ($p < 0.05$).

maximum in number in blood group O (31.57%) followed by group AB (26.31%), group A and B (21.05%). Chi-square test performed on the data shows statistically significant difference ($p = 0.02$). Table 2 also shows BT more than 4 min maximum in number in group O (82.35%) followed by group A (11.76%), group B (5.88%), and group AB (0%). Chi-square analysis on the data show statistically significant difference ($p = 0.01$).

When gender-wise comparison was made it was found that CT and BT were raised in females than males, as shown in Table 3. Table 3 shows that the CT is more than 6 min in 57.89% in females as compared to 42.10% in males, this variation was statistically significant ($p = 0.01$). Table 3 shows the BT is more than 4 min in 58.82% in females as compared to 41.17% in males. This variation was statistically significant ($p = 0.03$).

Discussion

The present study was carried out with 150 students of age group 17–20 years, and it was found that the predominant blood group in our study was blood group O (40.7%) followed by blood group B (32.7%), A (18%), and AB (8.7%). Most of subjects having more than 6 min clotting time was in O blood group in comparison to other groups of ABO system ($p = 0.02$). Most of subjects having more than 4 min bleeding time in O blood group in comparison to other groups of ABO system ($p = 0.01$). Clotting time and bleeding time were prolonged in female in comparison to male significantly.

Our study showed same prevalence of ABO blood group as in Asiatic trend. Different researchers reported that the prevalence of ABO blood groups were O>B>A>AB.[13–16] Our study showed contradictory results to Indian trend which reported that the prevalence group is B followed by O>A>AB as reported by various researchers.[17–20] Franchini et al reported in their review article that the non-O group individuals have more chance to develop thrombosis than the O group individuals. This cause of thrombosis is due to the presence of more vWF in non-O group individuals.[21] Jenkins and O'Donnell in their study reported that non-O group individuals have 25% more vWF in comparison to group O individuals.[22] This explains raised BT and CT in O group individuals in comparison to non-O group. In our study, it was found that prolonged BT in O group followed by A, B, and AB, the difference is statistically significant ($p < 0.05$). Similar report of prolonged BT in blood group O than other groups were reported by various studies also but their difference was not statistically significant.[13,18,23,24] Our study showed contradictory results to certain studies, where BT was found more prolonged in the blood group AB compared to other groups, which was statistically significant.[14,15] In our study, CT was prolonged in blood group O followed by AB and A = B significantly ($p < 0.05$). Some studies reported contradictory results to our study that is prolonged CT in blood group B followed by O, AB, and A, which was not statistically significant.[13,18,24] Studies by Mahapatra and Mishra[14] and Sasekala and Saikumar[16] where CT was prolonged in blood group B followed by O, AB, A which was statistically significant ($p < 0.05$). When gender-wise comparison was made it was observed that there was higher BT and CT in females as compared to males, this variation was statistically significant ($p < 0.05$). Some other researchers reported similar findings of prolonged BT and CT in females as compared to males and the variation was statistically significant.[16,19,25] Mahapatra and Mishra[14] reported that there was no such variation of BT and CT between male and female. Female individuals having comparatively more bleeding time and clotting time may be due to the presence of hormone estrogen, which lowers the plasma level of fibrinogen and increase the clotting time.[26]

In this study the sample size was less. Further research should be performed with larger sample size. In this study only ABO blood group was considered. Analysis with other blood group system may also necessary. Plasma vWF levels should be estimated to rule out any reasons for the difference clotting and bleeding time among ABO blood groups, so that preventive measures could be adopted as soon as possible.

Conclusion

In this study, blood group O was the most common group while blood group AB was the least common group. CT was > 6 min and BT was > 4 min maximum in number in blood group O. Gender-wise BT and CT were higher in females than males. In this study we concluded that O blood group females are prone to certain diseases like epistaxis and thrombosis.

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