

ORIGINAL ARTICLE**To determine the relationship between bleeding time and clotting time and ABO blood groups**

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ABSTRACT:

Aim: To determine the relationship between bleeding time and clotting time and ABO blood groups. **Materials and methods:** This cross-sectional research was done at the Physiology department after obtaining approval from the institutional ethics council. After obtaining informed consent, 100 medical students in the age group of 17 to 20 years were selected for the study. **Results:** A total of 100 students in the age group of 17 to 20 years participated in this study. Out of 100 students, 65 were males and 35 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 (36%) > B (31%) > A (22%) > AB (11%). BT more than 3 minutes is found more in blood group AB (40%) followed by group O (20%), A (20%) and B (20%). The chi square test of the data shows statistically significant difference ($p=0.04$). Table 2 also shows CT of more than 4 minutes is more in blood group O (37.5%), followed by A (25%), B (25%) and AB (12.5%). However, chi square test does not show statistically significant result ($p = 0.33$). **Conclusion:** Our research findings indicate that blood type O had the highest prevalence, whereas blood group AB had the lowest prevalence. Furthermore, it was noted that individuals with an AB blood group had a higher incidence of bleeding time exceeding 3 minutes compared to individuals with other ABO blood groups. This difference was found to be statistically significant. On the other hand, individuals with a blood group O had a higher occurrence of CT exceeding 4 minutes, but this difference was not statistically significant when compared to individuals with other ABO blood groups.

Keywords: ABO blood groups, Bleeding time, Clotting time

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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]. 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[5]. Haemostasis is the spontaneous arrest of bleeding from injured capillaries and vessels which includes vasoconstriction, platelet plug formation, clot retraction, clot lysis[6]. 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[7]. 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[8]. As mentioned, ABO blood groups are associated with many diseases.

MATERIALS AND METHODS

This cross-sectional study was conducted in the department of Physiology after taking the approved by the institutional ethical committee.

Inclusion and Exclusion Criteria

After obtaining informed consent, 100 medical 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.

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.

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[9].

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[9].

STATISTICAL ANALYSIS

Statistical Analysis was carried out using SPSS version 21. 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 100 students in the age group of 17 to 20 years participated in this study. Out of 100 students, 65 were males and 35 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 (36%) > B (31%) > A (22%) > AB (11%) 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 (40%) followed by group O (20%), A (20%) and B (20%). The chi square test of the data shows statistically significant difference (p=0.04). Table 2 also shows CT of more than 4 minutes is more in blood group O (37.5%), followed by A (25%), B (25%) and AB (12.5%). However, chi square test does not show statistically significant result (p = 0.33).

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 80 males compared to 20% in females but was statistically insignificant (p=0.11). Table 3 also shows that CT is > 4 minutes in 62.5% of females compared to 37.5% in males and is statistically significant (p=0.03).

Table 1: Gender-wise distribution of ABO blood group

Gender	A	B	AB	O	Total
Male	15	18	8	24	65
Female	7	13	3	12	35
Total	22	31	11	36	100

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

Parameter	Time (minutes)	A	B	AB	O	Total (Percentage)	p Value
Bleeding Time	< = 3	21 (22.11%)	30(31.59%)	9(9.46%)	35 (36.84%)	95	0.04
	>3	1(20%)	1(20%)	2(40%)	1(20%)	5	
Clotting Time	< = 4	20 (21.74%)	29(31.52%)	10(10.87%)	33 (35.87%)	92	0.33
	> 4	2(25%)	2(25%)	1(12.5%)	3(37.5%)	8	

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	61 (64.21%)	4 (80%)	62 (67.39%)	3 (37.5%)
Female	34 (35.79%)	1 (20%)	30 (32.61%)	5 (62.5%)
p value	0.11		0.03	

DISCUSSION

This study was carried out with 200 students in the age group 17–20 years. A total of 100 students in the age group of 17 to 20 years participated in this study. Out of 100 students, 65 were males and 35 were females. 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 = 0.04). 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 = 0.33). Clotting time is found to be prolonged in females in comparison to males and is statistically

significant ($p = 0.03$).

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 [10-12]. 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[13-15].

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[13]. 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[14].

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[15]. 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[16,17].

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 Mahapatra B et al where CT was prolonged for blood group O but was statistically significant[16]. 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. In other works, CT was prolonged in blood group B followed by O, AB, A but was statistically significant [17].

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[18-20]. In another study, it was reported that there was no variation of BT and CT between the genders[20]. 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[21].

This study was conducted with 100 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 research findings indicate that blood type O had the highest prevalence, whereas blood group AB had the lowest prevalence. Furthermore, it was noted that

individuals with an AB blood group had a higher incidence of bleeding time exceeding 3 minutes compared to individuals with other ABO blood groups. This difference was found to be statistically significant. On the other hand, individuals with a blood group O had a higher occurrence of CT exceeding 4 minutes, but this difference was not statistically significant when compared to individuals with other ABO blood groups. There was a statistically significant difference in CT between females and men, with females having higher CT values.

REFERENCES

1. Akhtar MN, Tayyib A, Tasneem T, Butt AR. ABO blood group in patients with peptic ulcer disease: Association with secretor status. *Ann King Edward Med Coll.* 2003;9:238-40.
2. Qureshi MA, Bhatti R. Frequency of ABO blood groups among the diabetes mellitus type 2 patients. *J Coll Physicians Surg Pak.* 2003;13:453-5.
3. Favalaro EJ, Soltani S, McDonald J, Grezchnik E, Easton L, Favalaro JW. Reassessment of ABO blood group, sex, and age on laboratory parameters used to diagnose von Willebrand disorder: potential influence on the diagnosis vs the potential association with risk of thrombosis *Am J Clin Pathol.* 2005; 124(6):910-7.
4. Ruggeri ZM. Structure of von Willebrand factor and its functioning platelet adhesion and thrombus formation. *Best Prac Res Clin Haematol.* 2001;14:257-9.
5. Gill, J.C., E.J. Brooks, P.J. Bauer, W.J. Marks Jr and R.R. Montgomery, The effect of ABO blood group on the diagnosis of von Willebrand disease. *Blood,* 1987; 69: 1691- 1695.
6. Zhang H, Mooney CJ, Reilly MP. ABO blood groups and cardiovascular diseases. *Int J Vasc Med* 2012; article ID 641917:1–11.
7. Wiggins KL, Smith NL, Glaeer NL, Rosendal FR, Heckbert SR, PsatyBM, et al. ABO genotype and risk of thrombotic events and hemorrhagic stroke. *J Thromb Haemost* 2008;7:263–9.
8. Akhtar MN, Tayyib A, Tasneem T, Butt AR. ABO blood group in patients with peptic ulcer disease: Association with secretor status. *Ann King Edward Med Coll.* 2003;9:238-40.
9. Ziegler T, Jacobsohn N, Fünfstück R. Correlation between blood group phenotype and virulence properties of *Escherichia coli* in patients with chronic urinary tract infection. *Int J Antimicrob Agents* 2004;24 (Suppl 1):S70–5.
10. Guyton and Hall, Text book for medical physiology, Philadelphia, Elsevier Saunders, eleventh edition, 2010, 467.
11. Daniel M, Jaber MC, Stead RE, Reddy VM, Moir AA. Is admission for epistaxis more common in Caucasian than in Asian people? preliminary study. *Clin Otolaryngol.* 2006;31:386-9.
12. Gallinaro L, Cattini MG, Sztukowska M, Padrini R, Sartorello F, Pontara E, et al. A shorter von Willebrand factor survival in O blood group subjects explains how ABO determinants influence plasma von Willebrand factor. *Blood* 2008;111:3540-5. doi: 10.1182/ blood-2007-11-122945, PMID 18245665.
13. Franchini M, Capra F, Targher G, Montagnana M, Lippi G. Relationship between ABO blood group and

- von Willebrand factor levels: From biology to clinical implications. *Thromb J* 2007;5:14.
14. Jenkins PV, O'Donnell JS. ABO blood group determines plasma von Willebrand factor levels: A biologic function after all? *Transfusion* 2006;46(10):1836–44.
 15. Ghai CL. *A Textbook of Practical Physiology*. 7th edn. Jaypee Brothers Medical Publisher (P) Ltd., 2007. pp. 104, 118–22.
 16. Mahapatra B, Mishra N. Comparison of bleeding time and clotting time in different blood groups. *Am J Infect Dis* 2009; 5(2):113–5.
 17. Talib HV. *Handbook of Medical Laboratory Technology*. 2nd edn. New Delhi: CSB Publishers, 1991. pp. 205–10.
 18. Roy B Banerjee, Sathian B, Mondal M, Saha CG. Blood group distribution and its relationship with bleeding time and clotting time: A medical school based observational study among Nepali. Indian and Sri Lankan students. *Nepal J Epidemiol* 2011;1(4):135–40.
 19. Abhishekh B, Mayadevi S, Meena D, Usha KC. Distribution of ABO and Rhesus-D blood groups in and around Thiruvananthapuram. *Kerala Med J*. 2011;1:28–9.
 20. Adhikari P, Pramanik T, Pokharel R, Khanal S. Relationship between blood group and epistaxis among Nepalese. *Nepal Med Coll J* 2008;10(4):264–5.
 21. Ercan M, Yegin E, Akdeniz H, Irmak H, Bayiroglu F, Tuncer I. Effect of estrogen on fibrinogen clotting time in rabbits. *Trans J Vet Anim Sci* 1998;22:137–40.