



Original Research Article

Study of association of bleeding and clotting time with blood group among young adults

Jiby Jolly Benjamin¹, M Bagavad Geetha^{1,*}¹Dept. of Physiology, Sri Ramachandra Institute of Higher Education and Research, Chennai, Tamil Nadu, India

ARTICLE INFO

Article history:

Received 11-12-2020

Accepted 17-12-2020

Available online 11-01-2021

Keywords:

ABO antigen

Agglutination

von Willebrand factor

ABSTRACT

Background: Blood group plays a unique role in revealing the identity of an individual. Several studies have expressed variations in bleeding tendencies among individuals with various ABO blood groups. Hence a study was done to find association of bleeding and clotting time with this blood group.

Materials and Methods: This study had a cross-sectional study design and was done among 250 young adults. Slide agglutination method was used to assess ABO blood group; while Dukes and capillary tube method were used to determine bleeding and clotting time respectively. Chi-square analysis was done to analyze its association with blood group.

Results: Blood group O (38.4%) was found to be the major blood group among both genders, followed by B (34%), A (19.2%), AB (0.08%). Bleeding time of more than 4 minutes was found in both O and B group but the result was statistically not significant ($p=0.85$). Clotting time of more than 6 minutes was found again in both O and B groups and the difference was not significant ($p=0.96$). Bleeding time was found to be higher in males while Clotting time was found to be more prolonged in females however the difference was statistically less significant ($p>0.05$).

Conclusion: In this study, results have shown that blood group O was the predominant blood group among the study population and blood group O and B had prolonged bleeding and clotting time compared to other groups. Based on gender, females had higher clotting time compared to males.

© This is an open access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

1. Introduction

Since 20th century, the discovery of ABO blood group by the Scientist Karl Landsteiner led to the origin of blood banks. ABO blood group system has four blood groups namely 'A', 'B', 'AB' and 'O' groups. This blood group system is related to the antigenic property of Glycophorin- a protein which is present on the RBC membrane.¹

Certain diseases such as dental caries, peptic ulcer, heart disease, diabetes and gastric carcinoma are more common in individuals having a certain type of ABO blood group.² This difference is seen based on personality characters as well.³ Similarly, studies have shown variation among ABO blood groups in terms of bleeding tendencies by stating

that O blood group individuals are more likely to develop haemorrhage while AB blood group are liable to develop thrombosis.⁴⁻⁶

'A' and 'B' antigens are inherited as Mendelian dominants.⁷ 'A' and 'B' antigens are found in blood as complex oligosaccharides that vary only by their terminal sugars. 'A' antigen has N-acetyl galactosamine while 'B' antigen has galactose as their terminal sugars with rest of chemical structure remaining the same.⁸

In addition, these antigens are covalently bound to asparagine linked sugar chains of von Willebrand factor (vWF).⁹ vWF is a glycoprotein synthesized by endothelial cells and platelets. This factor usually co-exists with the coagulation factor VIII and is stored in intracellular granules of megakaryocytes when not in demand. Functionally, vWF helps in adhesion and aggregation of platelets, thus

* Corresponding author.

E-mail address: bagavadgeetha@sriramachandra.edu.in (M. B. Geetha).

partnering with them in the role of hemostasis.¹⁰ Therefore, higher levels of vWF can lead to risk of thrombus formation, while lower levels can lead to von Willebrand disease.

Studies have revealed that ABO gene locus accounts for approximately 30% of genetic determinant of vWF levels. By this, it is clearly understood that ABO blood group does have an influence on plasma vWF levels. Hence the absence of A and B antigen can indirectly lower the plasma levels of vWF forming one reason why bleeding tendencies are predominantly seen in O blood group. Moreover the absence of ABO antigens hastens the clearance of vWF from plasma forming another reason for lower levels of plasma vWF in O blood group individuals.¹¹ Hence, ABO blood group indirectly has an effect on bleeding and clotting time; however certain discordant studies also exist against this thought too.

Therefore the aim of this study was to determine the predominant ABO blood group among the young adult population, to find its association with bleeding and clotting time. In addition, gender variation in bleeding and clotting time was also assessed.

2. Materials and Methods

Before conducting the study, clearance from the Institutional ethics committee (Ref: CSP-MED/18/OCT/47/157) and informed written consent from all participants were obtained. This cross-sectional study was done among 250 medical and paramedical students.

ABO blood group, bleeding time and clotting time were the parameters assessed in this study and were done along with their routine haematology practicals. Those students on chronic medication with NSAIDs, anti-platelet or anti-coagulant drugs were excluded from the study.

Blood group was assessed by simple agglutination method.¹² Presence of agglutination indicated that antigen-antibody complexes were being formed and by this antigen present in the given sample of blood was found. Bleeding time was assessed by Dukes method.¹³ It was considered as the time from the onset of bleeding till unaided spontaneous cessation of bleeding occurred. Normal range for bleeding time by this method was taken as 1-5 minutes. Clotting time was assessed by capillary tube method.¹⁴ It was considered as the time from the onset of bleeding till the time clot was formed. Normal range for clotting time by capillary tube method was taken as 3-8 minutes.

For the purpose of research, those subjects with blood values on the higher side of the normal range were taken into account. Therefore, bleeding time of more than 4 minutes and clotting time of more than 6 minutes were considered as cut off for finding its association with various ABO blood groups.

Analysis was done using R software. Chi-square analysis was done to assess association of bleeding time and

clotting time with blood group. Statistical significance was considered when p value was less than 0.05.

3. Results and Discussion

In this study, 105 participants were males and the rest 145 participants were females (Figure 1).

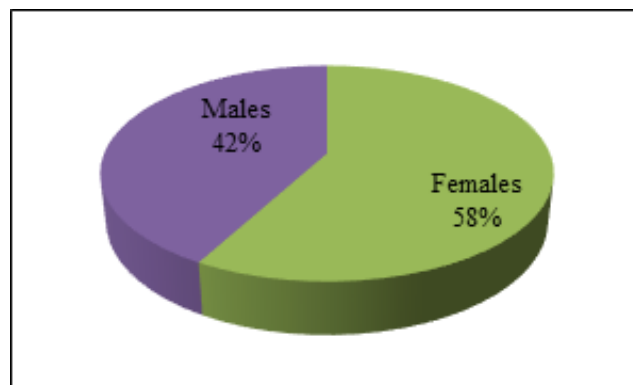


Fig. 1: Gender wise distribution of the selected study population

The major ABO blood group among the young adult population was found to be O blood group (38.4%), followed by B (34%), A (19.2%) and the finally by AB (0.08%) blood group (Table 2).

Bleeding time more than 4 minutes was found to be equal in both O and B blood groups (50%) and none in A and AB groups (Table 2). Chi-square analysis on the data showed statistically not significant p-value ($p=0.85$).

Clotting time more than 6 minutes was found in both blood groups O and B (40%) followed by group A (20%) and none in AB blood group. Chi-square test performed on the data showed statistically non significant p-value ($p=0.96$). When gender-wise comparison was made it was found that BT was higher in males while CT was higher in females (Table 3).

BT more than 4 minutes was higher in males ($p>0.05$). CT more than 6 minutes was found in 71.42% in females and 28.57% in males ($p>0.05$).

In this present study done among 250 participants aged from 18 to 24 years, blood group O was the most predominant blood group among the ABO blood groups. This is similar to the result obtained by Agrawal et al¹⁵ where he also found O blood group (37.12%) to be predominant in their study population. But our results are contrary to those obtained by Garg et al¹⁶ where B blood group (32.07%) was found to be the most common ABO blood group.

Subjects having bleeding time more than 4 minutes belonged to both O and B blood group in comparison to other groups of ABO system and result was statistically not significant ($p>0.05$). This result is similar to those obtained by Manjeet et al¹⁷ where bleeding time > 4 minutes was

Table 1: Shows gender wise distribution of ABO blood group

Gender	A blood group	B blood group	AB blood group	O blood group	Total
Female	30 (62.5)	49 (57.6)	11 (52.3)	55(57.29)	145 (58.00)
Male	18 (37.5)	36 (42.35)	10(47.61)	41 (42.7)	105(42.00)
Total	48 (19.2%)	85 (34%)	21 (0.08%)	96 (38.4%)	250 (100)

Table 2: shows distribution of bleeding time and clotting time among ABO blood group with p values

Variable	Time (min)	A	B	AB	O	P value
Bleeding time	<4	48(19.27)	84 (33.73)	22(0.08)	95 (38.15)	0.85
	>4	0(0)	1 (50)	0 (0)	1 (50)	
Clotting time	<6	47 (19.18)	83 (33.87)	21 (0.085)	94 (38.36)	0.96
	>6	1(20)	2 (40)	0 (0)	2 (40)	

Table 3: Shows gender-wise distribution of bleeding time and clotting time

Variable	Bleeding time		Clotting time	
	<4	>4	<6	>6
Male	103 (41.53)	2(100)	103 (42.38)	2 (28.57)
Female	145 (58.46)	0 (0)	140 (57.61)	5 (71.42)

more common among O and B blood groups but was statistically insignificant. Study done by Reeta et al.,¹⁸ showed that bleeding time of more than 4 minutes were found predominantly in O blood group individuals with a statistically significant p value ($p=0.01$). While study done by Gavali et al¹⁹ did not find any significant difference in bleeding time between O and non-O blood groups.

In this study, subjects having clotting time more than 6 minutes were found in both O and B blood groups and this result also was statistically not significant ($p>0.05$). These results are consistent with the study done by Thenmozhi S et al²⁰ where he found clotting time >6 mins in O group was not statistically significant. In contrast to our study, study done by Yasmeen et al²¹ stated a significant association (p value<0.05) of clotting time with O and AB blood group.

Furthermore, in our study clotting time more than 6 minutes was found to be higher in females compared to males but again the result was statistically not significant. This result was similar to those obtained by Kaur et al¹⁷ where prolonged clotting time were more common among females but did not have any statistical significance. Studies done by Baishya et al,¹⁸ Mondal et al.²² and Sasekala et al²³ found both bleeding time and clotting were found to be significantly higher in females compared to males.

On the other hand, bleeding time more than 4 minutes was found to be higher in males. This result is inconsistent with the study done by M.Nazeer et al²⁴ where BT were found to be higher in females but with no significant statistical values. Studies have found bleeding and clotting time seems to be prolonged in females compared to males. Many trials done previously have found that platelet function reduces significantly following oestrogen therapy.²⁵

The proposed reason was that oestrogen increases the prostaglandin level which in turn reduces platelet aggregation and function. However, the exact mechanism of how oestrogen increases prostaglandin level remains unknown. In addition, the presence of oestrogen decreases fibrinogen levels and thereby prolongs the clotting time in females. On the other hand, presence of androgens hastens the activation and aggregation of platelets and thus shortens the bleeding time.²⁶ This could be the possible explanation for gender variation seen in bleeding and clotting time.

Even though Dukes method and capillary tube method can be easily done and assessed, they are not very reliable for getting accurate results. Moreover serum calcium, fibrinogen and vWF levels were not tested along with the blood parameters for correlation.

4. Conclusion

We conclude that predominant blood group belonged to O and those belonging to O and B blood group had values of BT and CT closer to the upper limit of the normal range which could be due to reduced expression of vWF and factor VIII levels. CT was found higher in females because of reduced fibrinogen levels as they have more oestrogen.

In future, larger sample sized studies can be conducted estimating platelet, serum vWF, calcium and fibrinogen levels in addition to BT and CT as they also play a role in haemostasis and clotting. This enables the study to be more precise.

5. Sources of Support

None.

6. Conflicts of Interest

The authors have no conflicts of interest.

7. Acknowledgement

We are thankful to the management, laboratory staff and medical students of Sri Ramachandra Medical College and Research Institute for helping us conduct this study.

References

- Blood group - The importance of antigens and antibodies | Britannica. Available from: <https://www.britannica.com/science/blood-group/The-importance-of-antigens-and-antibodies>.
- Ewald DR, Sumner SCJ. Blood type biochemistry and human disease. *Wiley Interdiscip Rev Sys Biol Med*. 2016;8(6):517–35. doi:10.1002/wsbm.1355.
- Tsuchimine S, Saruwatari J, Kaneda A, Yasui-Furukori N. ABO Blood Type and Personality Traits in Healthy Japanese Subjects. *PLoS ONE*. 2015;10(5):e0126983. doi:10.1371/journal.pone.0126983.
- Gill JC, Endres-Brooks J, Bauer PJ, Marks WJ, Montgomery RR. The effect of ABO blood group on the diagnosis of von Willebrand disease. *Blood*. 1987;69(6):1691–6.
- Zhou S. Is ABO blood group truly a risk factor for thrombosis and adverse outcomes? *World J Cardiol*. 2014;6(9):985.
- Reddy VM, Daniel M, Bright E, Broad SR, Moir AA. Is there an association between blood group O and epistaxis? *J Laryngol Otol*. 2008;122(4):366–8. doi:10.1017/s0022215107008560.
- Yamamoto F, Cid E, Yamamoto M, Blancher A. ABO Research in the Modern Era of Genomics. *Transfus Med Rev*. 2012;26(2):103–18. doi:10.1016/j.tmr.2011.08.002.
- Kim SD, Shin KR, Zhang BT. Molecular immunocomputing with application to alphabetical pattern recognition mimics the characterization of ABO blood type. In: 2003 Congress on Evolutionary Computation, CEC 2003 - Proceedings; 2003. p. 2549–56.
- Matsui T, Titani K, Mizuochi T. Structures of the asparagine-linked oligosaccharide chains of human von Willebrand factor. Occurrence of blood group A, B, and H(O) structures. *J Biol Chem*. 1992;267(13):8723–31.
- Peyvandi F, Garagiola I, Menegatti M. Gynecological and obstetrical manifestations of inherited bleeding disorders in women. *J Thromb Haemost*. 2011;9:236–45. doi:10.1111/j.1538-7836.2011.04372.x.
- Gallinaro L, Cattini MG, Sztukowska M, Padrini R, Sartorello F, Pontara E. A shorter von Willebrand factor survival in O blood group subjects explains how ABO determinants influence plasma von Willebrand factor. *Blood*. 2008;111(7):3540–5. doi:10.1182/blood-2007-11-122945.
- Pal GK, Pal, Pravati. Textbook of Practical Physiology. 2nd ed.; 2006.
- Ghai C. A Textbook of Practical Physiology; 2013.
- Pal GK, Pal P. Textbook of practical physiology; 2001.
- Agrawal A, Bhattacharya P, Kamath S, Mehta N, Tiwari AK, Tulsiani S, et al. ABO and Rh (D) group distribution and gene frequency; the first multicentric study in India. *Asian J Transfus Sci*. 2014;8(2):121–5. doi:10.4103/0973-6247.137452.
- Garg P, Upadhyay S, Chufal SS, Hasan Y, Tayal I. Prevalance of ABO and Rhesus blood groups in blood donors: A study from a tertiary care teaching hospital of Kumaon region of Uttarakhand. *J Clin Diagnostic Res*. 2014;8(12):16–9.
- Kaur M, Singh A, Bassi R, Kaur D. Blood group distribution and its relationship with bleeding time and clotting time. *Natl J Physiol, Pharm Pharmacol*. 2015;5(3):253–7. doi:10.5455/njppp.2015.5.2609201433.
- Baishya R, Sarkar R, Barman B. Blood group and its relationship with bleeding time and clotting time- an observational study among the 1st MBBS students of Gauhati medical college, Guwahati. *Int J Res Med Sci*. 2017;5(9):4147. doi:10.18203/2320-6012.ijrms20174000.
- Gavali M, Singru S, Gavali Y, Preeya M, Krishnakant P. Comparison of BT (Bleeding Time) / CT (Clotting Time) with Respect to Blood Group in Medical Students. *Int J Heal Sci Res*. 2017;7(1):57–63.
- Thenmozhi S, Neelambikai N, Aruna P. Comparison of Bleeding Time and Clotting Time in Different ABO Blood Groups; 2013.
- Yasmeen N, Ali I, Shaikh R. Gender Based Blood Group Distribution and Its Relationship With Bleeding Time And Clotting Time In Medical Students. *Biomed Pharmacol J*. 2014;7(2):619–21. doi:10.13005/bpj/533.
- Mondal M, Sathian B, Banerjee I, Roy B, 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*. 2012;1(4):135–40.
- and MS. Relationship Between Bleeding Time And Clotting Time Among Gender Difference And Varying Blood Groups In UG Medical Student. *IOSR J Dent Med Sci*. 2013;10(6):40–3. doi:10.9790/0853-1064043.
- Nazeer M, Aara S, Rafiq N. Blood Groups, BT and CT in Medical and Para Medical Students-Gender Based Distribution and Their Relation. An Observational Study. *Int J Med Sci Clin Invention*. 2018;5(2):3553–6. doi:10.18535/ijmsci/v5i2.13.
- Dupuis M, Severin S, Noirrit-Esclassan E, FArnal J, Payrastré B, Valéra MC. Effects of Estrogens on Platelets and Megakaryocytes. *Int J Mol Sci*. 2019;20(12):3111. doi:10.3390/ijms20123111.
- Ferenchick G, Schwartz D, Ball M, Schwartz K. Androgenic-Anabolic Steroid Abuse and Platelet Aggregation: A Pilot Study in Weight Lifters. *Am J Med Sci*. 1992;303(2):78–82. doi:10.1097/00000441-199202000-00002.

Author biography

Jiby Jolly Benjamin, Post Graduate

M Bagavad Geetha, Professor

Cite this article: Benjamin JJ, Geetha MB. Study of association of bleeding and clotting time with blood group among young adults. *Indian J Clin Anat Physiol* 2020;7(4):350-353.