

Difference of Clotting Time and Bleeding Time in the ABO Blood Groups

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ABSTRACT

Introduction: Blood group, clotting time (CT) and bleeding time (BT) are vital haematological parameters that are tested prior to any surgery. Blood groups are associated with various diseases and blood group "O" linked with nose bleeds. The aim of this study is to evaluate the association between CT and BT between various blood groups and to find differences in gender among these parameters.

Study Design: A cross-sectional observational study.

Place and Duration: In the department of Physiology and Medicine, MTI LRH, Peshawar Pakistan for one-year duration from March 2021 to February 2022.

Methods: This study was held amongst the 200 healthy individuals. The agglutination method is used for blood grouping, capillary tube method for CT and Dukes method for BT. Mean clotting and bleeding times (in seconds) were compared.

Results: The study was conducted among 200 individuals (120 men, 80 women) aged 20-25 years. Although the changes were not statistically significant, the values of CT and BT were higher in blood group O, less BT in type B and AB blood grouping had lowest CT ($p > 0.17$). Women had greater CT and BT values than men (p values < 0.001). There was also a significant association between the clotting time and bleeding time (Pearson's correlation coefficient, $p = 0.512$, $p < 0.001$).

Conclusion: The conducted analysis showed a propensity to a greater jeopardy of haemorrhagic conditions and a lesser risk of thrombotic events in "O" blood group in comparison to groups AB, A or B. A multicentre, bigger population study with an importance on determining plasma vWF levels may be useful for confirming results, identifying risk groups and taking preventive measures early.

Keywords: Bleeding time (BT), ABO blood group, von Willebrand factor (vWF) and Clotting time (CT).

INTRODUCTION

In ABO blood group system, a person is categorized as AB, A and B or "O" based on the absence or presence of AB, B and A antigens on the surface of their red blood cells¹⁻². As a result, the subject's plasma will comprise antibodies against A, B neither, or both A+B, correspondingly. This difference of serology amid subjects was initially defined in 1900 by Landsteiner³⁻⁴. This system of blood grouping helps for the safe performance of organ transplants, blood transfusions and surgery, and is also beneficial in defining several added immune properties⁵. It is also used as genetic markers to study their relationship to various diseases. Blood groups are associated with several diseases. The well-established relations are the association of blood group A is with gastric cancer, and blood group O has relation with duodenal ulcer⁶. Additional connotations are blood group A had thromboembolic disorders, females with blood group B have urinary tract infections. Blood type O has a higher incidence of bleeding nose in blood group A. It is supposed that blood group O people express low von Willebrand factor (vWF) level⁷. The megakaryocytes and endothelial cells synthesized blood glycoprotein and involved in hemostasis, promotes platelet aggregation and adhesion. It as well performances as a special protein of carrier for coagulation factor VIII (antihemophilic factor A)⁸. This might emphasize the effect of grouping system of ABO on clotting time and bleeding time. Bleeding time (BT) is the time from the start of bleeding until the establishment of a temporary haemostatic plug that halts bleeding⁹. By platelet aggregation; formation of temporary hemostatic plug achieved when platelets come into contact with collagen which is exposed and attach to a protein and collagen called von Willebrand factor. It is primarily a test for the assessment of platelet aggregation and adhesion and may be suggestively delayed in congenital or acquired platelet dysfunction and thrombocytopenia¹⁰. The clotting time is the time from the start of bleeding to the development of fibrin threads or the formation of a clot. In cases where the clotting factors are damaged or missing, the CT is protracted¹¹. Standard time of bleeding are usually in the range of 1 to 5 minutes. Standard time of clotting varies from 2-8 minutes. Studies have been carried out to investigate the relationship between different blood groups and

these parameters of haemostatic function¹². Overall, both CT and BT were supposed to be protracted in blood group O or B, but other researches have different results. The aim of this study is to evaluate the association between CT and BT between various blood groups and to find differences in gender among these parameters.

METHODS

This study was held amongst the 200 healthy individuals with 20-25 years of age range in the department of Physiology and Medicine, MTI LRH, Peshawar Pakistan for one-year duration from March 2021 to February 2022. The individuals with a history of haematological disorders, recent NSAID medications, or no antiplatelet and anticoagulant medications were not included. After taking informed consent, Rh blood groups and ABO blood groups were governed by the method of agglutination. The samples of blood were mixed with antisera A, B and D, correspondingly, and red blood cell clumping was checked under a microscope to determine group of blood. The agglutination method is used for blood grouping, capillary tube method for CT and Dukes method for BT. Mean clotting and bleeding times (in seconds) were compared. To determine the BT by the Duke method, a typical size skin puncture was made into any of these fingers (middle, index or ring finger) with a sterile lancet using precautions of aseptic techniques, and after every 30 seconds, the bleeding was soaked with a blotter paper till the stoppage of bleeding. Bleeding time was defined as the time (in seconds) from injury of the finger to no blood on the blotting paper. 1-5 minutes was the normal bleeding time. Likewise, the capillary method was used for the clotting time. Using a sterile lancet, a skin puncture of standard depth was made at the tips of the any of the 3 fingers (middle, index or ring finger) using precautions of aseptic techniques. The 1st blood drop was wasted and the next blood was introduced by capillary action in to the into the capillary tube. A capillary tube is apprehended between the palms to maintain body temperature. After 2 minutes, the capillary tube was fragmented approximately one-two cm from the tip after every thirty-second until fibrin threads thin string had moulded in the fragmented ends. The bleeding onset time and the fibrin string formation time was recorded as the clotting time in

seconds. 2-8 minutes was the normal clotting time determined by capillary tube method. A stopwatch was used to monitor times to estimate bleeding and clotting times.

Microsoft Excel sheets were used for data collection and SPSS 21.0 for statistical analysis. CT and BT alterations among the groups were equated using ANOVA and the p value was expected to 0.05.

RESULTS

The study was conducted among 200 individuals (120 men, 80 women) aged 20-25 years. While only 26 subjects (9.1%) have AB blood group, the dispersal of in other blood groups was analogous (28.2-32.2%). 9 subjects (4.5%) were Rh negative according to the Rhesus groups (Table 1).

Table 1: The distribution of frequency by ABO type, Rh type and sex (N = 200)

Groups	Subgroups	Frequency	Percentage
Sex	Male	120	60
	Female	80	40
ABO type	A	52	26
	B	73	36.5
	AB	26	13
	O	49	24.5
Rhesus type	Positive	191	95.5
	Negative	9	4.5

The mean CT and BT results comparison for each ABO groups of blood were done (Table 2). Although the changes were not statistically significant, the values of CT and BT were higher in blood group O, less BT in type B and AB blood grouping had lowest CT (p> 0.17). Women had greater CT and BT values than men (p values <0.001). There was also a significant association between the clotting time and bleeding time (Pearson's correlation coefficient, p = 0.512, p <0.001). Likewise, there was an increase in the values of both parameters in Rh-negative subjects compared to Rh-positive subjects, but the changes were not significant statistically. The relevance of this verdict is doubtful as there are rare individuals of Rh negative. Though, the gender comparison exhibited statistically substantial variances. The clotting and bleeding times were longer significantly in women than in men (p <0.001).

Table 2: Comparison of CT and BT in different gender and blood groups

Group	Subgroups	Number of students	BT, secs (mean ±SD)	CT, secs (mean ±SD)
ABO type	A	52	140.25±106.71	260.81±150.18
	B	73	120.80±69.2	248.78±122.75
	AB	26	146.89±64.21	224.89±82.42
	O	49	154.1±134.76	283.41±186.32
	ANOVA F (P value)		1.650 (0.167)	1.600 (0.240)
Rhesus type	Positive	191	140.88±102.71	260.91±149.32
	Negative	9	154.33±97.41	306.61±234.14
	ANOVA F (P value)		0.210 (0.640)	1.050 (0.310)
Sex	Male	120	118.25±57.68	210.60±84.25
	Female	80	159.70±125.88	302.09±180.80
	ANOVA F (P value)		14.002 (<0.001)	37.122 (<0.001)

DISCUSSION

Especially in cases such as frequent nosebleeds, thrombosis, purpura, blood group, clotting time and bleeding time are very imperative tests accomplished formerly any surgery¹²⁻¹³. The blood group is the 'primary' haematology test for blood transfusions and is also valuable information when dealing with legal cases¹⁴. Research also suggests probable variances in haemostatic function between various groups of blood. The BT was calculated by the duke method and capillary method is used for the clotting time¹⁵. Comparable approaches have been used in various researches that revealed an association between different blood

groups and clotting and bleeding time¹⁶. In our study, blood group B was the communal blood group trailed by blood groups AB, O, and A correspondingly. Bleeding time was longer in blood groups A, B and AB after blood group O¹⁷. CT also supposed to be high in the similar blood group, trailed by blood groups AB, A and B with no statistical substantial difference (p> 0.05)¹⁷. Comparable outcomes were also described in the analysis by Baishy et al., in which they institute BT prolongation in O blood group, then AB, A and B. Contrary to this analysis, his outcomes were significant statistically at P <0.05¹⁸. The blood group O was the most common in Baishy et al study, followed by AB, A and B. When Kaur et al. Exhibited comparable outcomes, institute that the BT was protracted in blood groups B, AB and A after blood group O, and the clotting time was longer in blood groups O, AB after blood group B with insignificant difference¹⁹. CT and BT have statistically significant difference in this study between ABO blood groups. The O blood group was most communal trailed by AB, A and B. It was institute that the BT was protracted in B and O blood groups and shorter in blood groups A and AB, but it was not statistically significant (p = 0.90). Likewise, blood groups O and B has the longer clotting time but the alterations were not significant statistically²⁰. Regarding the difference in gender, the Benjamin et al study found that males have higher BT (p <0.05), while females have higher CT(p> 0.05). There were statistically significantly high clotting time and bleeding time values in women compared to men (p <0.001). Comparable results have been reported in various researches²¹⁻²². Women have high levels of estrogen. Administration of estrogen result in slight rise in fibrinogen coagulation time (or a reduction in plasma fibrinogen) in rabbits²³⁻²⁴. This may emphasize increased CT in women and the physiological basis of CT. The differences in CT and BT in the Rh negative and positive groups might not be generalizable because the groups are disproportionately large²⁵.

CONCLUSION

This study results exhibited a longer clotting and bleeding time in "O" blood group compared to other ABO system blood groups, though the variances were not statistically significant. The analysis showed a higher bleeding risk in "O" blood groups in comparison to other groups. Therefore, the conclusions might be supportive in identifying the risk group earlier and taking precautionary actions.

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