

Blood group distribution and its association with bleeding time and clotting time among medical students



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ABSTRACT

Background: Blood group, bleeding time (BT), and clotting time (CT) are routinely performed tests in the hospital, especially before any surgeries and blood transfusion. **Aims and Objectives:** The objective of the study is to see if there is any association of blood group with BT and CT and the gender difference in BT and CT. **Materials and Methods:** A cross-sectional study was conducted among 132 medical students of 1st year in the hematology laboratory of the Department of Physiology in KIST Medical College from June 2022 to September 2022. The blood group was determined by a simple agglutination method. BT was determined by Dukes method whereas CT was determined using capillary tube method. Data were analyzed using SPSS-20 software. The difference in BT and CT among various blood groups was done using the ANOVA test and $P \leq 0.05$ was considered significant. Student's t-test was used to find the association of gender with BT and CT. **Results:** Both BT and CT were found to be more in males than females. However, the difference was significant only in the mean BT ($P = 0.05$, Table 2). There was no significant difference in the mean BT among various blood groups but CT was found to be significant ($P = 0.05$). **Conclusion:** Our study showed the tendency of bleeding to be more in blood Group B individuals. Multicentric study including a larger population with plasma level of von Willebrand factor might be helpful to verify findings and identify the risk group.

Key words: Blood group; Bleeding time; Clotting time

INTRODUCTION

Bleeding time (BT) can be defined as the time taken from the puncture of the blood vessel to the stoppage of bleeding. Normal BT is 1–5 min by the Dukes method.¹ BT is prolonged in congenital and acquired platelet defects.² Clotting time (CT) is the time interval from the puncture of blood vessel to the formation of fibrin thread. Normal CT by capillary tube method is 2–8 min.¹ CT is prolonged in conditions where clotting factors are deficient or defective.³ These tests are widely used not just to evaluate platelet function but also to assess the effects of medications and medical devices (cardiopulmonary bypass or dialysis machine) on hemostatic status.⁴ In the ABO blood group system, an individual is classified as A, B, AB, or O on the basis of presence or absence of antigen on the surface

of red blood cell. Many studies have been conducted to explore the relationship between blood group and BT, CT. The previous studies have shown that epistaxis is encountered more in people having blood group O which is thought to be due to a lower level of plasma von Willebrand factor (vWF) in blood group O.⁵ Both BT and CT have been found to be prolonged in blood Group O but not in all studies. Many diseases are found to be associated with blood groups, such as gastrointestinal infections are more common in the O blood group whereas blood Group A, B, and AB are more prone to thrombotic disease.^{6,7} Hence, ABO blood group indirectly has an effect on BT and CT; however, discordant studies have been also there. Not only in different blood groups but BT and CT also seems to vary in males and females. Many studies have shown longer BT and CT in females than males.^{8,9}

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Very few studies have been conducted in Nepal related to blood group and its association with BT and CT and the results have been different.

Aims and objectives

- 1) To determine the ABO blood group in young medical students and find its association with bleeding time and clotting time
- 2) To assess the gender difference in bleeding time and clotting time

MATERIALS AND METHODS

A cross-sectional study was conducted among 132 medical students of 1st year over a period of 3 months (June 2022–September 2022). The study was conducted in the hematology laboratory in the Department of Physiology, KIST Medical College, Gwarko, Lalitpur. The study was done only after getting approval from the Ethical Review Committee of the Institution (Reference number:2078/79/68).

After getting the informed consent, demographic information along with their medical history was noted. The blood group (ABO and Rh type) was assessed by simple agglutination method. Blood samples were mixed with antisera A, B, and D, respectively. The presence of agglutination indicated that antigen-antibody complexes were formed, and thus, antigen present in the given sample of blood was found. BT was assessed by Dukes method whereas CT was assessed by Capillary tube method. To estimate the BT by the Duke method, a standard-size skin puncture was made on the tip of one of the three (ring, middle, or index) fingers by a sterile lancet under aseptic precautions and the bleeding was soaked every 30 s using a blotting paper until the bleeding stopped. BT was determined as time (seconds) from the infliction of finger prick injury to the absence of blood to the blotting paper. Normal BT in the Dukes method is 1–5 min. Similarly, CT was estimated by the capillary tube method. Taking the aseptic measures, a standard depth skin puncture was made on the tip of the three (ring, middle, or index) fingers using a sterile lancet. The first drop of blood was discarded and the subsequent blood was filled into a capillary tube by capillary action. The capillary tube was held between palms, to keep the blood in body temperature. After a time-lapse of 2 min, the capillary tube was broken at about 1–2 cm from one end every 30 s until the appearance of a thin string of fibrin thread formed between the broken ends. The time lapse between the onset of bleeding until the formation of fibrin thread was noted to be the CT (seconds) and the normal CT range in the Capillary tube method is 2–8 min. Analysis was done using SPSS-20

software. Differences between BT and CT among various blood groups were done using ANOVA test and $P \leq 0.05$ was considered significant. Student's t test was used to find the association of gender with BT and CT.

Inclusion criteria

Healthy medical students of 1st year were included in the study.

Exclusion criteria

Students having any chronic illness and taking NSAIDS were excluded from the study.

RESULTS

Out of 132 students, 68 (51.51%) were males and 64 (48.48%) were females. Blood group O was the most common blood group (33.33%) among the participated subjects whereas only 13.6% of the subjects had blood group AB. Regarding the Rh blood group, only 3.03% (4/132) were found to be Rh –ve as shown in Table 1. The mean BT among the subjects was found to be 164.79 ± 62.8 s and the mean CT was found to be 288.67 ± 129.54 s. Both BT and CT were found to be more in males than females. The difference in the mean BT between male and female was significant ($P=0.05$, Table 2). No significant difference was observed in CT in between the two genders.

The mean BT and CT were compared between various blood groups of ABO type (Table 3).

The mean BT and CT were found to be the longest in blood group B comparing to other blood groups. Similarly, blood Group A had the shortest BT and CT among all (Table 3). There was no significant difference in the mean BT among various blood groups but a significant difference was observed in the mean CT among different blood groups. Furthermore, there was a significant difference in the mean BT between males and females of blood Group B ($P < 0.05$) as shown in Table 4. No significant difference was found in CT between males and females among various blood groups (Table 5).

Table 1: Blood group distribution

Blood group (n=68)	Male (n=64)	Female (n=132)	Total	%
ABO type				
A	17	20	37	28.03
B	20	13	33	25
O	21	23	44	33.33
AB	10	8	18	13.6
Rh Type				
Positive	65	63	128	96.96
Negative	3	1	4	3.03

Table 2: Gender-wise distribution of bleeding time and clotting time

Hematological parameter	Gender			P-value
	Total (n=132)	Male (n=68)	Female (64)	
Bleeding time (s)	164.79±62.8	174.95±65.08	154±59.04	0.05
Clotting time (s)	288.64±129.54	294.91±160	282.04±86.28	0.57

Table 3: Comparison of bleeding time and clotting time among various blood groups

Group	Bleeding time (s)	P-value	Clotting time (s)	P-value
A	147.87±59.67	0.14	250.09±73.83	0.05
B	182.0571±62.75		326.14±203.55	
O	167.27±68.10		302.81±92.38	
AB	157.05±50.89		255.65±79.1	

Table 4: Gender-wise comparison of bleeding time among various blood groups

Blood group	Bleeding time (s)		P-value
	Male (n=68)	Female (64)	
A	151.87±54.1	144.11±65.87	>0.05
B	203.85±59.8	153±55.92	0.01
AB	171.81±60.1	139±31.04	>0.05
O	166.66±73	167.82±64	>0.05

Table 5: Gender-wise comparison of clotting time among various blood groups

Blood group	Clotting Time (s)		P-value
	Male (n=68)	Female (64)	
A	263.31±71.61	237.64±75.87	>0.05
B	353.2±262.4	290.06±68.86	>0.05
AB	241.9±82.4	272.44±76.22	>0.05
O	291.23±88.1	313.39±96.8	>0.05

DISCUSSION

Pre-operative hemostasis evaluation has always been a significant factor in the minds of surgeons and anesthesiologist before any surgery. Hemostasis has been divided into the vascular/platelet phase and coagulation phase. The tests available for vascular phase are BT, platelet count, and platelet function assay and the tests for the coagulation phase are CT, prothrombin time, plasma fibrinogen, and activated plasma thromboplastin time. BT and CT are still requisitioned as a routine preoperative test in many hospitals in addition to other tests for hemostasis.¹⁰

In our study conducted among 132 students, the percentage distribution of blood groups did not show predominance of any blood group. Except blood Group AB, which was least common among the students (13.6%), there was not much difference in the percentage distribution of various blood groups among the students. In some studies, blood Group B was found to be the most common.^{11,12} However, in our study, the prevalence of blood Group O was found

to be highest which is similar to many studies.^{3-5,13,14} In our study, the percentage distribution of blood groups was in the order of O>A>B>AB.

Both BT and CT were found to be more in males than females in our study though the significant difference was found only in BT. A result similar to this was found in a study done by Benjamin and Bagavad where BT was found to be prolonged in males as compared to females.¹⁵ Our result was similar to the study done by Gavit and Bhorania where CT was prolonged in males compared to females.¹⁶ Contrary to our finding, there are many studies where females had longer BT and CT which is thought to be due to estrogen which decreases the level of fibrinogen in blood.^{1,3,6,17,18} In our study, only females with blood group O had longer BT and CT than males which was not statistically significant. Although males had longer CT than females, no statistically significant difference was observed between them which was similar to some studies which have shown no significant difference in BT and CT among males and females.^{3,14}

In hemostasis, vWF is very important. It is needed for platelet adhesion and aggregation. Studies have revealed that the ABO gene locus accounts for approximately 30% of the genetic determinant of vWF level which implies that the ABO blood group does influence plasma vWF levels. Hence, the absence of A and B antigens can indirectly lower plasma vWF levels which can be the reason for bleeding tendencies being more common in blood group O.¹⁹

Many researches in the past have described that BT is prolonged in blood Group O due to less expression of vwf.^{16,20-22} but in our study, BT and CT were found to be prolonged in blood Group B, followed by blood Group O, which is similar to the study done by Mahapatra and Mishra, but no significant correlation was found between BT and the various blood groups. The correlation of CT with various blood groups was found to be just significant which was contrary to the studies done by Manandhar and Amatya¹⁷ and Monika et al.,⁶ where no significant difference was found in BT and CT among

various blood groups. Another study done by Chinara et al., also showed no correlation between BT, CT, and blood groups.²²

Limitations of the study

Since the study was done in a small sample size, the findings may vary with the other studies. Multicentric study in larger population with plasma vWF level could help to verify findings.

CONCLUSION

Blood Group B was found to be having longer BT and CT followed by O. The association between CT and various blood groups was found to be just significant. BT among various blood groups was not significantly different. There was no significant association of gender with CT. Only males with blood Group B were having significantly longer BT than females. Further research with a larger sample size needed to confirm on the relationship of various blood groups with BT and CT.

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