ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

DO BLEEDING TIME AND CLOTTING TIME CHANGE WITH GENDER?

Retash Shan[1], Mamta Sharma[1], Kailash Singh[2] *Raju Kumar[3], Rajinder Kumar Jangral[4], Ritu Gupta[1], Dev Raj[5]

[1]Department of Physiology, GMC Jammu, Bakshinager, J & K UT-180001
[2]Department of Surgery, GMC Jammu, Bakshinager, J & K UT-180001
[3]Department of Nephrology, GMC Jammu, Bakshinager, J & K UT-180001
[4]Department of Anatomy, GMC Jammu, J & K UT-180001
[5]Department of Community Medicine, GMC Jammu, J & K UT-180001

Corresponding Author:
Dr Raju Kumar, Consultant Nephrology, SSH Block, GMC Jammu. Email: gmcjammuresearcher@gmail.com

Abstract

Background: Hemostasis is the process through which bleeding stops on its own. To assess the overall health of hemostatic systems, the bleeding (BT) and clotting time (CT) is used. An assessment of hemostasis must precede each surgical procedure in a hospital. A BT or CT is necessary for epistaxis, hemoptysis, gastrointestinal, and variceal bleeding. These, on the other hand, have a role in thrombotic risk and cardiovascular disease. As a result, the researchers in this study set out to see if there were any variations in bleeding and clotting times between young boys and girls. To establish gender disparities in BT and CT among young medical students and examine any correlation between the parameters.

Material and Methods: This cross-sectional survey was carried out between September 2021 and December 2021 in the haematology lab at GMC Jammu's Department of Physiology after receiving IEC permission (Vide No. IEC/GMC/Cat C/2021/532 dated 24/05/2021) and informed consent, involved 250 healthy first-phase MBBS students (17-20 years old) from both genders. According to established protocols, CT and BT were evaluated using Wright's Capillary tube and Duke's filter paper method. Average BT and CT values for male and female medical participants were assessed. All data were reported as Mean with Standard Deviation. We used unpaired t-test analysis with the help of the SPSS 26.0 version to look for BT and CT measurement discrepancies. The Chi-square test did further research to examine any correlation between the parameters. A p-value less than five per cent was deemed statistically significant.

Results: In the current research, BT mean values were 2.28 ±0.63 minutes in men and 2.42 ±0.59 minutes in women. In the end, the p-value was found to be 0.066. CT values were 4.61 ±1.22 minutes for men and 5.10 ±1.57 minutes for women, a statistically significant difference (p=0.006). BT and CT appear to be influenced by gender.

Conclusion: In our study, the comparison of gender to bleeding and clotting times in age-matched participants reveals that females had slightly greater BT and CT values than males.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

The lower hematocrit and the effects of estrogen with lower fibrinogen levels in women may account for the more prolonged BT and CT, respectively.

Keywords: Bleeding Time, Clotting Time, Medical Students.

Introduction

Hemostasis is the cessation of bleeding. Bleeding time and Clotting time are indications of the health of the hemostatic mechanisms. In addition to haemoglobin levels, differential leukocyte counts (DLC), total leukocyte counts (TLC), blood grouping, platelet counts, bleeding time and clotting time are essential before surgical procedures. Bleeding Time (BT) is the interval between the rupture of a blood vessel and the spontaneous, unassisted stop of bleeding.[1] This is primarily dependent on the adhesion and aggregation functions of platelets. Clotting Time (CT) is the time between blood vessel penetration and the formation of fibrin threads.[2] A deficiency or absence of coagulation factors might prolong the clotting process.[3]

The phases of hemostasis are the vascular and coagulation phases. Bleeding time, platelet count, and platelet function assay can be used to monitor the early phase's activity.[4] Several assays, including clotting time, prothrombin time, plasma fibrinogen time, and activated plasma thromboplastin time, can determine the coagulation phase.[5] In compliance with CBME Competency No. PY2-11, the first phase curriculum for medical undergraduates, includes BT and CT tests. BT and CT are two straightforward tests used to check the haemostatic mechanism before all surgical procedures, biopsies, and the initiation of anticoagulant therapy.[6]

BT is intended for testing primary haemostasis, dependent on the effectiveness of vasoconstriction and platelet plug formation and can be measured by several methods, including the Duke's Method, Ivy's Method, Simplate method, and Capillary fragility test of Hess. Clinical laboratories regularly employ Dukes's Method to determine bleeding time. The normal duration of bleeding ranges from 2 to 6 minutes. It is contingent upon Platelet Count, Platelet Aggregation, Von Willebrand Factor, and Capillary Integrity. CT is intended for evaluating secondary haemostatic processes and can be determined using various techniques, including the Capillary blood clotting time, Drop Method, and Lee and White test. The Wright glass capillary tube method is widely used in clinical laboratories to determine clotting time. Normal values range from 3 to 8 minutes.[7]

In all abnormalities of hemostasis, BT and CT are performed together. Both tests utilise platelets. There are various factors on which BT and CT depend. BT is contingent on the size and depth of the wound, the degree of hyperemia, the number of platelets and their functional status, the functional status of the blood vessels, and the temperature. Similarly, CT depends on the contact surface’s nature, the presence or absence of clotting agents, and the temperature.[7]

The literature presents inconsistent conclusions regarding the factors affecting BT/CT. Moreover, India lacks studies with appropriate sample sizes. We analysed BT/CT in medical students, compared it to gender, and examined the association between BT/CT and gender using a large sample size.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

Objectives

To establish gender disparities in BT and CT among young medical students and examine any correlation between the parameters.

Material and Methods

Study design: A cross-sectional investigation.

Study settings: This investigation was carried out from September 2021 to December 2021 on 250 healthy first-year MBBS students at the Department of Physiology haematology lab at GMC Jammu, with IEC approval and informed consent.

Study subjects: The study subjects were selected as follows:

Inclusion Criteria: This research included the following factors:

• The age range for first-year medical students was retained between 17 and 20.

• Males and females constitute an equal share of medical research participants.

Exclusion Criteria: This study excluded participants with bleeding/clotting time issues, Nonsteroidal anti-inflammatory medicines (NSAIDs), anti-platelets, or anticoagulants, and smokers to prevent bias.

Laboratory Analysis: According to established protocols, CT and BT were evaluated using Wright's Capillary tube and Duke's filter paper method.[7] The current investigation was done in the haematology lab between 3 and 4:30 p.m. Two study investigators conducted the BT & CT tests and collected data from the individuals. The bleeding time range for Duke's approach was 2 to 6 minutes on average. Specifically, a deep finger prick was made, and the time required for bleeding to cease recorded by blotting the drop of blood from the incision with blotting paper every 30 seconds. Multiplying the number of dots on the filter paper by thirty seconds yielded BT. 3 to 8 minutes was the range for clotting time as assessed by Wright's capillary tube. Under strict aseptic conditions, a conventional skin incision was done, and blood was extracted. Blood clotting time was determined by severing a capillary tube after 2 minutes, 1-2 centimetres from one end every 30 seconds until fibrin thread developed. The bleeding and clotting times were estimated using a stopwatch. Average BT and CT values for male and female medical participants were assessed. For calculation purposes, BT levels were classed into less than 2 min, 2-6 min, and more than 6 min. Likewise, CT was categorised as less than 3 min, 3-8 min, and more than 8 min.

Ethical Clearance: IEC permission received from IEC of GMC Jammu vide IEC permission (No. IEC/GMC/Cat C/2021/532 dated 24/05/2021).

Statistical Analysis: We used unpaired t-test analysis with the help of the SPSS 26.0 version to look for BT and CT measurement discrepancies. The Chi-square test was further studied to research any correlation between the parameters. All data were presented as a percentage, range, and mean ±SD. A p-value less than five per cent was deemed statistically significant.

Results

In this study, BT ranged from 1.31 to 5.36 minutes, with a mean of 2.42 minutes among 250 participants aged 17 to 20. The CT range was 3.63 to 8.31 minutes, with a mean value of 5.10 minutes. Mean BT values were 2.28 ±0.63 minutes for men and 2.42 ±0.55 minutes for women among 125 males and females. Ultimately, a p-value of 0.066 was determined. CT values were 4.61 ±1.22 minutes for men and 5.10 ±1.57 minutes for women, a statistically

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

significant difference (p=0.006). While analysing the relationship between gender and BT and CT, it was determined that normal BT (2-6 min) was observed in 210 subjects (96 males and 114 females); less than 2 min BT was observed in 40 subjects (29 males and 11 females), and BT levels greater than 6 minutes were not kept in any of the subjects. With a P-value of 0.002, it is reasonable to conclude that females had slightly higher BT values. CT levels of 3-8 min (Normal range) were detected in 246 subjects (122 males and 124 females), CT levels of less than 2 min were detected in 2 subjects (2 males only), and CT levels of greater than 8 min were detected in 2 subjects (one of each gender). The p-value was found to be 0.477 using a Chi-square analysis. There appears to be a gender effect on BT and CT. Tables 1 through 5 below present the analysed data.

Table1: Distribution of study participants by gender

Gender	Frequency	Per cent
Males	125	50.0
Females	125	50.0
Total	250	100.0

Table 2: Pattern of the demographic attributes of the participants

Parameter	Number	Mean	Std. Deviation	Minimum	Maximum
Age	250	18.0080	0.69416	17.00	20.00
Weight	250	55.7680	6.20809	45.00	74.00
Height	250	165.0840	10.75078	145.00	180.00
BMI	250	20.4492	1.68523	16.20	25.40

Table 3: Comparative analysis of the demographic characteristics of male and female individuals

Parameter	Gender	Number	Mean	SD	Significance	
					t-value	p-value
Age	Males	125	17.8320	0.63164	-4.137	0.097
	Females	125	18.1040	0.71147		
Weight	Males	125	60.8320	4.50580	22.341	<0.0001
	Females	125	50.7040	2.32110		
Height	Males	125	175.0000	4.24644	38.110	<0.0001
	Females	125	155.1680	3.97723		
BMI	Males	125	19.8568	1.77529	-5.927	<0.0001
	Females	125	21.0417	1.35779		

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

Table 4: Comparative analysis of BT (min) and CT (min) for male and female participants

Parameter	Gender	Number (N)	Mean	SD	Significance	
					t- value	p-value
BT (min)	Males	125	2.2820	0.6334	1.845	0.066
	Females	125	2.4260	0.5994		
CT (min)	Males	125	4.6080	1.2174	2.791	0.006
	Females	125	5.1040	1.5700		

Table 5: Association of gender with BT and CT

Gender	BT (min)			Total	CT (min)			Total
	Decreased (<2)	Normal (2-6)	Prolonged (> 6)		Decreased (<3)	Normal (3-8)	Prolonged (> 8)	
Males	29	96	0	125	2	122	1	125
Females	11	114	0	125	0	124	1	125
Total	40	210	0	250	2	246	2	250
Chi. Sq. Value	9.643				0.504**			
P-value	0.002				0.477			
	** Yates Chi. Sq. Value							

Discussion

Study participants were divided equally (125 were males and 125 were females) between sexes to determine whether there was any link between BT/CT scores and gender among the 250 young people (aged 17-20) who took part in the experiment. A considerable disparity in clotting times was found between men and women (p=0.006) [Table 4]. There was a statistically substantial distinction between the clotting times of males and females. Reeta B etal. and Roy B et al. who explored the variance of BT and CT in males and females, reported comparable results to ours.[8,9] In a study conducted by Manjeet K & Arvinder S and Meena M & Sunil KJ, it was found that females have more excellent BT and CT levels than males.[10,11] According to statistical analysis, this difference is not statistically significant. Nevertheless, few studies have found differences between males and females in BT and CT.[12] Likewise, in terms of the connection between BT and CT and gender. Our research revealed a substantial difference between males and females in BT (p=0.002) [Table 5]. There was a statistically significant disparity between male and female bleeding times. Waghmare RV and Muniyapppanavar NS, who studied the variance of BT and CT in boys and females, revealed results comparable to ours.[13] Females have higher levels of BT and CT than males, according to a study by Jha RK etal. This change is not statistically

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

significant, according to the analysis.[14] Several studies, however, have found no difference between males and females in BT and CT.[15]

In light of the above findings, there was a gender effect on BT and CT outcomes and a link between BT and CT and gender. Platelet activation and adhesion may be higher in men due to their shorter bleeding time.[16] In contrast, oestrogen decreases platelet activity and lengthens the duration of bleeding in females.[17] Additionally, it reduces estrogen levels responsible for females' longer CT. Females reported elevated amounts of oestrogen and decreased plasma fibrinogen. This may explain why female patients bleed and clot more slowly than male patients. Additional research with a bigger sample size of students from the corresponding years for analysis may help address the information gap about a potential link; inclusion of thorough age and occupation variations and multicentric studies are required. Analyse plasma fibrinogen, von Willebrand factor, platelet counts, serum calcium, and oestrogen levels to discover the probable cause of the varying amounts. This will assist us in identifying the risk group and implementing necessary preventative steps before developing these conditions.

Conclusion

In our study, a comparison of the bleeding and clotting times of patients of the same gender and age showed that females had marginally higher BT and CT values than males. Our research revealed a significant difference between male and female participants and an association between gender and BT & CT.

References

1. Bijlani RL, Manjunatha S. Understanding Medical Physiology: A Textbook for Medical Students. 4th ed. India: Jaypee Brothers Medical Publishers (P) Ltd; 2011.p.94-100.
2. Guyton JH, Hall JE, Hall ME. Textbook for Medical Physiology. 14th ed. Philadelphia, PA: Elsevier; 2021.p.487.
3. Pal GK, Pal Pravati. Textbook of Medical Physiology. 3rd ed. India: Ahuja Publishing House; 2019.p.139-140.
4. Harker LA and Slichter SJ. The bleeding time as a screening test for evaluation of platelet function. N. Engl J Med. 1972 Jul 27; 287(4): 155-59.
5. Kinra P, Tewari V and Raman RTS. Role of bleeding time and clotting time in preoperative hemostasis evaluation. Ind J Aerospace Med. 2009; 53: 56-61.
6. Reddy L Prakasam. Practical Physiology. 4th ed. Hyderabad/New Delhi: Paras Medical Publisher; 2021.p.53-56.
7. Gahi CL. Textbook of Practical Physiology. 9th ed. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd; 2019.p.79-89.
8. Reeta B. Blood group and its relationship with bleeding time and clotting time-an observational study among the 1st MBBS students. Int J Res Med Sci 2017; 5: 4147-50.
9. Roy B, Banerjee I, 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.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 04, 2022

10. Manjeet K, Arvinder S. Blood group distribution and its relationship with bleeding and clotting time. Natl J of Physiol and Pharmacol 2015; 5: 253-7.
11. Meena M, Sunil KJ. Distribution of blood groups and its relation to bleeding time and clotting time. Int J Med Sci Public Health 2016; 5: 1-4.
12. Adhana R, Chaurasyiya R, Verma A. Comparison of bleeding time and clotting time between males and females. Natl J Physiol Pharm Pharmacol 2018; 8(10): 1388-1390.
13. Waghmare RV, Muniyappanavar NS. Influence of blood groups on bleeding and clotting time. Int Physiol 2018; 6: 200-4.
14. Jha RK, Kushwaha MS, Kushwaha DK, Tiwari S, Bhandari A, Nepal O. Blood group distribution and its relationship with bleeding and clotting time in undergraduate medical students. Int J Res Rev 2017; 4: 10-5.
15. Verma A, Chaurasia R, Adhana R, Ballabh J, Kaur J. Interdependence of major blood group with bleeding time and clotting time. Medpulse Int J Physiol 2019; 11: 34-7.
16. Martina E Daily. Determinants of platelet count in humans. Haematologica 2011; 96: 10-3.
17. Miller VM, Jayachandram M, Hashimoto K, Heit JA, Owen WG. Estrogen, inflammation, and platelet phenotype, Gend Med. 2008; 5 Suppl A: S91-S102