Determination of Mean Bleeding Time and the Knowledge of Conditions Associated with Variations in Mean Bleeding Time among 1st year MBBS, Rawalpindi Medical University

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Abstract

Introduction: Bleeding time is a vital hemostatic parameter used to assess the platelet function and the overall blood coagulation. Bleeding time is defined as the average time taken by incision to stop bleeding.

Objectives: This study aimed to evaluate the mean bleeding time, identify conditions that might cause fluctuations in the mean bleeding time, and explore how early indications of such conditions might help improve the medical sector.

Materials and Methods: The study population comprised first-year MBBS students of Rawalpindi Medical University, aged between 18 and 22 years. Bleeding time was measured using Duke's method. To assess factors influencing bleeding time, a specifically designed questionnaire was administered, covering lifestyle and health-related variables. Data was analyzed using IBM SPSS version 26 to determine the mean bleeding time and its correlation with different health conditions.

Results: Results showed a range of bleeding times from less than 1 minute (n=28, 28%) to 3 minutes 30 seconds (n=0, 0%), with the average and most common bleeding time being 1 minute (n=38, 38%), as analyzed using SPSS software. Other observed values included 1 minute 30 seconds (n=20, 20%), 2 minutes (n=11, 11%), 2 minutes 30 seconds (n=1, 1%), and 3 minutes (n=2, 2%). Additionally, bleeding time was found to vary based on factors such as ABO blood group and Rh factor, with slight fluctuations across different groups, as well as lifestyle and health-related variables. These included metabolic conditions, physical activity, presence of chronic diseases such as anaemia (n=4, all <1 min), use of anticoagulants (n=0), and smoking habits (n=0 across all categories). However, no single factor showed a significant correlation with shortened bleeding times.

Conclusion: The factors contributed to understanding bleeding time variations and optimizing treatment strategies for early intervention, ultimately improving patient's outcomes.

Keywords: Bleeding time, Von Willebrand Disease, Blood Platelet Disorders, Thrombocytopenia, Haemostasis, Blood Coagulation factors, Purpura, Health Status.

Introduction

The test used in the laboratory to assess the clotting function of platelets in blood is referred to as bleeding time.[1] Mean bleeding time needs to be checked if a person has been showing a delayed clotting response to a wound. This test involves puncturing the skin with a small needle and then calculating the time required to stop the bleeding.[2] It is the only test available to study the efficiency of blood hemostasis.[3] Hemostasis refers to the mechanism that leads to cessation of bleeding from a blood vessel. It is a process that involves multiple interlinked steps. This cascade culminates in the formation of a "plug" that closes the damaged site of the blood vessel, controlling the bleeding.[4] There are two methods of calculating bleeding time: Duke's Method and IVY method[5]. Duke's method involves rupturing the skin with a needle at the fingertip and then calculating the time required to stop the bleeding.[2] Standard bleeding time by this method is 3 minutes.[6] The other method is the IVY method, which is considered the standard method. It requires rupturing an artery, mostly the Brachial Artery in the cubital fossa by puncturing the skin almost 1-3mm deep. The blood is removed every 30 seconds till the bleeding stops. The normal bleeding time by this method is 9-10 minutes. The delayed results in the calculation of bleeding time can lead to possible diagnosis of platelet disorders like Thrombocytopenia, Von Willebrand disease, Purpura, and many more.[5]

Many studies have been conducted globally using mean bleeding time as a tool to assess the frequency of diseases related to clotting of blood and the factors on which blood clotting depends. The studies conducted globally have shown a standard mean bleeding time as 3 minutes by Duke's Method and 9 minutes by IVY method.[7] The statistics obtained by results of mean bleeding time showed that the incidence of major bleeding and mortality rate due to coagulative diseases was low.[8]

The objective of our study is to calculate the mean bleeding time among the students of Rawalpindi Medical University between the ages of 18-21 and the possible factors like stress, use of drugs, smoking, and diet, which can affect the mean bleeding time among students of this age group. This study will help us know about the frequency of coagulative blood disorders which may be present among the students of this age group. Through this study, we aim to determine the mean bleeding time and investigate its correlation with various demographic parameters such as age, gender, body mass index, to evaluate the effect of different haematological parameters and explore the relationship between mean bleeding time and inherited bleeding disorders and to highlight the possible indications of prolonged bleeding time and low bleeding time.[9]

Materials and Methods

A cross-sectional study was conducted in Rawalpindi Medical University from April 2024 to June 2024, including students of the 1st year MBBS with an age range of 18-22 years. The sample size was 100 including individuals who had given consent. Participants with bleeding disorder, any chronic illness, using medication which affected bleeding time were excluded. The

Duke's method was used to assess bleeding time. This method involves pricking participants' earlobe or finger with a special needle or lancet, and the bleeding time is measured using a stopwatch. To examine the factors influencing bleeding time, a specially designed questionnaire was developed in accordance with ethical principles of confidentiality, autonomy, and beneficence. It assessed participants' lifestyle attributes, including physical activity, habits, medication use, and any history of drug addiction. The data of 100 RMU students was collected after informed consent. Following the use of the Duke's method, data was collected by circulating Google forms. After the data collection, the data was analysed by using IBM SPSS software version 26 by comparing the Bleeding time test results with different parameters, analysing how mean bleeding time is affected with various health conditions.

Results

The result of the study shows how the mean bleeding time among the students at medical university vary in a range of less than one minute up to 3 minutes 30 seconds as calculated by performing bleeding time test through Duke's method. The average and most prevalent bleeding time is estimated to be 1 minute among the 1st year MBBS students at Rawalpindi Medical University as illustrated in the tables made by SPSS software after analyzing the collected data.

Table 1 *Bleeding Time Test Results*

Bleeding Time	Frequency (n)	Percent (%)
Less than 1minute	28	28.0
1 minute	38	38.0
1 minute 30 seconds	20	20.0
2 minutes	11	11.0
2 minutes 30 seconds	1	1.0
3 minutes	2	2.0

Table 2 *Bleeding Time Test Result with Respect to Gender*

Bleeding Time	Male	Female
Less than 1minute	2	16
1 minute	6	32
1 minute 30 seconds	6	24
2 minutes	2	9
2 minutes 30 seconds	0	1
3 minutes	1	1
3 minutes 30 seconds	0	0

Table 3 and 4 shows how the bleeding time differ with ABO blood group, Rh factor, metabolic conditions, physical activity, different chronic diseases like anaemia intake of anticoagulants, smoking etc.

Though the fluctuation in bleeding time i.e. less than one minutes (abnormal bleeding time) is seen among number of students however no significant factor seems to be influencing this decreased bleeding time.

Table 3 *Bleeding Time Test Result (number of individuals)*

Bleeding Time	Rh Factor +ve				Rh Factor -ve			
	A	**B**	**AB**	**O**	**A**	**B**	**AB**	**O**
Less than 1minute	8	8	0	1	0	0	0	1
1 minute	19	10	4	4	1	0	0	0
1 minute 30 seconds	15	6	6	1	1	0	0	1
2 minutes	5	0	0	3	1	0	0	0
2 minutes 30 seconds	0	0	0	1	0	0	0	0
3 minutes	0	2	0	0	0	0	0	0
3 minutes 30 seconds	0	0	0	0	0	0	0	0
More than 3 minutes	0	0	0	0	0	0	0	0

Table 4 *Bleeding Time Test Result (number of individuals)*

Variables	Levels	< 1min	1 Min	1 Min 30s	2 Min	2 Min 30s	3 Min	3 Min 30 Sec	> 3 Min
Suffering From Chronic Health Issue	Yes	2	0	0	2	0	0	0	1
	No	26	38	20	9	1	2	0	0
Regular Physical Exercise	Yes	14	17	6	4	1	0	0	0
	No	11	18	12	5	0	2	0	0
Good Metabolism	Yes	12	12	8	5	0	0	0	0
	Fairly Good	7	18	6	5	1	2		
	Maybe	9	5	2	1	0			
	No	0	3	4	0	0			
Smoking	Rarely	0	0	0	0	0			
	Occasi-onally	0	0	0	0	0			
	Very Often	0	0	0	0	0			
	Never	28	38	20	11	1	0	0	0
Anticoagulant Drugs Uptake	Yes	0	0	0	0	0	0	0	0
	No	28	38	20	11	1	2	0	0
Anaemic	Yes	4	0	0	0	0	0	0	0
	No	24	38	19	11	1	2	0	0

This indicates some underlying cause of reduced bleeding time except for the factors that might influence bleeding time. One of the major underlying causes of bleeding time less than one minute is low platelet count or platelet disfunction. Deeper study needs to be conducted in this regard.

Discussion

Bleeding time plays an essential role in finding the adequacy of platelet function and is an essential measure of haemostasis. Several important studies have been conducted to broaden the understating of bleeding time and associated factors.

Bleeding time when properly standardized, is an important test in the evaluation of a haemostatic disorder.[10] Notably research include the investigations made by PM Mannucci in which prolonged bleeding time was seen in people with von Willebrand disease.[11] RK Smiley has even done a similar study as this.[12] Moreover, the research made by Ramanathan J revealed a significant correlation between thrombocytopenia and prolonged bleeding time by conducting a study on relation between platelet count and bleeding time.[13]

Furthermore, studies have been made where bleeding time falls below the expected range which is an indication towards hyper coagulability or other haemostatic abnormalities such as enhanced platelet reactivity.

The studies conducted in Pakistan also exhibited the cases of low bleeding time than expected range and the potential reasons include genetic defects affecting coagulation factor levels, environmental factors, dietary factors, and healthcare access yet a common certified reason is still unknown.

Our research also found a significant number of students having a low bleeding time despite normal influential factors which might indicate the presence of hypercoagulable states in which increased levels of procoagulant factors promote accelerated clot formation and haemostasis.[14] In such cases, individuals may exhibit shortened bleeding times despite an overall balance in haemostatic function. However, further research is needed to elucidate the precise mechanisms driving this phenomenon and find out the root cause of low bleeding time.

Conclusion

The research conducted by RMU students examined mean bleeding time and the various factors that can influence it. The study identified instances of low bleeding time, which may suggest underlying issues such as platelet dysfunction. This finding opens up opportunities to explore the connections between bleeding time and other haemostatic phenomena, highlighting its potential significance in diagnosis.

References

1. Anonymous. Bleeding time: reference range, interpretation, collection and panels [Internet]. Medscape. n.d. [cited 2024 Nov 27]. Available from: https://emedicine.medscape.com/article/2085022-overview
2. Anonymous. Bleeding time test: purpose, procedure, and risks [Internet]. Healthline. n.d. [cited 2024 Jun 8]. Available from: https://www.healthline.com/health/bleeding-time
3. Rodgers RPC, Levin J. A Critical Reappraisal of the Bleeding Time. Semin Thromb Hemost

2024;50(3):499–516; doi:10.1055/S-0043-1777307.

4. LaPelusa A, Dave HD. Physiology, hemostasis [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [cited 2024 Nov 27]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK539777/

5. Lusher JM. Screening and diagnosis of coagulation disorders. Am J Obstet Gynecol 1996;175(3 Pt 2):778–783; doi: 10.1016/S0002-9378(96)80084-6.

6. Russeau AP, Vall H, Manna B. Bleeding time [Internet]. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2023 [cited 2024 Nov 27]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK507799/

7. Anonymous. Bleeding time: reference range, interpretation, collection and panels [Internet]. Medscape. n.d. [cited 2024 Nov 27]. Available from: https://emedicine.medscape.com/article/2085022-overview#a1

8. Tosetto A, Rodeghiero F, Castaman G, et al. Bleeders, bleeding rates, and bleeding score. J Thromb Haemost. 2013;11(Suppl 1):142–50. doi:10.1111/jth.12248

9. Sasekala M, Saikumar P. Relationship between bleeding time and clotting time among gender difference and varying blood groups in UG medical students. Int J Clin Biomed Res. 2015;1(4):19–23.

10. Bowie EJW, Owen CA. Standardization of the bleeding time. Scand J Haematol Suppl 1980;37(37 S):87–94; doi: 10.1111/J.1600-0609.1980.TB01344.X.

11. Anonymous. Studies on the prolonged bleeding time in von Willebrand's disease [Internet]. PubMed. n.d. [cited 2024 Nov 27]. Available from: https://pubmed.ncbi.nlm.nih.gov/787458/

12. Smiley RK, Tittley P, Rock G. Studies on the prolonged bleeding time in von Willebrand's disease. Thromb Res 1989;53(5):417–426; doi: 10.1016/0049-3848(89)90196-5.

13. Ramanathan J, Sibai BM, Vu T, et al. Correlation between bleeding times and platelet counts in women with preeclampsia undergoing cesarean section. Anesthesiology 1989;71(2):188–191; doi: 10.1097/00000542-198908000-00003.

14. Kobrinsky NL, Gerrard JM, Watson CM, et al. SHORTENING OF BLEEDING TIME BY 1-DEAMINO-8-D-ARGININE VASOPRESSIN IN VARIOUS BLEEDING DISORDERS. The Lancet 1984;323(8387):1145–1148; doi: 10.1016/S0140-6736(84)91393-X.