Normal range of bleeding time in urban and rural areas of Borujerd, west of Iran

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Original Article

Abstract

BACKGROUND: Bleeding time (BT) is the oldest and simplest test for assessing the platelets (Plts) function. BT can affect by several factors such as race and diet, which has a wide reference range. The aim of this project is to determine the normal range of BT in Borujerd, Iran. Determining the normal range of BT can help us to modify the definition of bleeding disorder and aspirin resistance.

METHODS: This was cross-sectional study carried out in 2011-2012. Subjects with a history of coagulation disorders or a positive family history of coagulation disorders, consumption of anti-Plts, anti-histamines, and phenothiazine in the previous month and subject with Plt less than 150,000 were excluded. The samples were 505 volunteers who were referred from 16 urban and 9 rural clusters to research center. BT of the samples was determined according to Ivy simplate method considering national standard protocol in the selected persons. Normal range was calculated as mean ± 2 standard deviation.

RESULTS: Of 505 volunteers, 50.4% were female. The range of BT was 2.8-2.95 min with mean of 2.79 ± 0.78 min. Range and mean of BT in women was 2.83-3.06 min and 2.88 ± 0.87 min, and range and mean of BT in men was 2.7-2.9 min and 2.69 ± 0.67 min; this difference was significant (P = 0.012). BT in urban and rural participants was 2.78 ± 0.79 and 2.77 ± 0.73 min. There was no significant difference between BT in urban and rural participants.

CONCLUSION: The normal range of BT in Boroujerd was in the lower limit of the normal universal range. In this study, BT was significantly different in both genders, but its correlation with age, blood group, and place of residency was not significant.

Keywords: Bleeding Time, Blood Platelet, Iran

Introduction

Platelets (Plts) play an important role in blood clotting and hemostasis. The function of Plts is assessed by various methods. Bleeding time (BT) is the oldest test for assessing the Plts function. The benefits of this test are that it is quick and facile. BT is defined as the time from the moment that incision is made to the point where bleeding ceases. Several factors such as Plt count, hematocrit and temperature can influence BT.[1] Furthermore, it is reported that race and diet can affect the Plt aggregation.[2]

According to our knowledge, it is the first time that BT has been assessed in this amount of sample volume in Iran. The aim of this study was to evaluate BT in Borujerd population, a city in the west of Iran. Determining the normal range of BT can help us to modify the definition of bleeding disorder and aspirin resistance. Recently, aspirin resistance is presented as a predictor of cardiovascular disease.

Materials and Methods

This cross-sectional study was done in Borujerd, a city in the west of Iran in 2011-2012. The Research and Ethics Committee of Lorestan University of Medical Sciences, Iran, approved this study (No.

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1255). Written informed consent was taken from all participants. Due to lack of similar published information, primarily a pilot study was designed, and based on its measured variance, the sample size was determined. The pilot study was performed on 30 subjects. According to the results of the pilot study, a sample size of 580 persons, including 290 in each gender groups was estimated by a power of 0.95.

Inclusion criteria comprised of volunteers aged 35 years or more, and signature of written consent. The subjects with a history of coagulation disorders or a positive family history of coagulation disorders, consumption of anti-Plts (such as aspirin and indomethacin), anti-histamines, and phenothiazine in the previous month and the subjects with Plts less than 150,000 were excluded. The samples were consecutively selected from the patients who were referred to 16 urban and 9 rural health and treatment centers. A trained nurse recorded their medical history according to the questionnaire. BT of the samples was determined according to Ivy simplate method considering national standard protocol in the selected persons.

For performing the Ivy simplate method, a blood pressure cuff was placed on the upper arm and then was inflated to 40 mmHg. An incision with a length of 8 mm and a depth of 1 mm was made by a lancet in the anterior section of the underside of the forearm in an area without superficial veins. The beginning of incision until the time that bleeding stopped was described as BT.[3] Digital chronometers were used to measure time, and all samplers had similar chronometers. A standard filter paper was used every 30 s to draw off the blood until the blood stopped completely. The blotting paper was coded and was sent to a research center to fill table times according to codes of blotting paper of each sample and was reevaluated by a second observer. One sampler was trained for performing the test. Due to painfulness of this technique, the process was performed just once for each participant, but two observers recorded all the results: one person recorded the results during the test, and the other one interpreted the results and recorded them in the related forms. When there were differences in sample reading, we considered the mean of the two results.

Statistical analysis
The recorded data were analyzed by SPSS for Windows (SPSS 13.0, SPSS Production Facility, Chicago, IL, USA). The P value of < 0.05 and confidence interval of 95% were considered as statistically significant. Continuous parameters were described as mean ± standard deviation (SD). The data were analyzed with Student's t-test, and one-way ANOVA test categorical data were described as percentages and analyzed by chi-square test. Normal range was calculated as mean ± 2SD.

Results

The present study was performed on 505 volunteer subjects (75 subjects were excluded from the study). About 50.4% of the participants were female, and 49.60% were male. The youngest participant was 35 years old, and the oldest one was 88 years old. In this study, the normal range of BT in the participants was 1.23-4.35 min with a mean of 2.79 ± 0.78 min. The normal range and mean of BT in women were 1.14-4.62 min and 2.88 ± 0.87 min, and the normal range and mean of BT in men were 1.35-4.03 min and 2.69 ± 0.67 min, respectively. Independent t-test showed a significant difference between BT in women and men (t = 2.520, P = 0.012).

The BT according to the blood group and Rh are shown in table 1. The difference between BT in blood groups as was not significant (P = 0.590). The BT according to the age groups is shown in table 2. There was no significant difference between BT in different age groups by one-way ANOVA test (P = 0.683).

Three hundred and sixty-three participants (72%) had been living in urban areas. BT in urban and rural participants was 2.78 ± 0.79 and 2.77 ± 0.73 min, respectively. There was no significant difference between BT in urban and rural participants.

Table 1. The bleeding time according to the blood groups and Rh represented by mean ± standard deviation

	Total	A (n = 152)	B (n = 122)	AB (n = 35)	O (n = 196)	P*
Total	2.56 ± 1.27	2.79 ± 0.77	2.80 ± 0.80	2.64 ± 0.59	2.79 ± 0.89	0.59
Rh positive (n = 468)	2.57 ± 1.27	2.75 ± 0.78	2.84 ± 0.86	2.64 ± 0.59	2.73 ± 0.72	0.66
Rh negative (n = 37)	2.50 ± 1.27	3.17 ± 0.60	2.42 ± 0.45	-	3.31 ± 1.02	0.37*
P**	0.42	0.49	0.51	-	0.53	-

* One-way ANOVA test; ** Student's t-test

Table 2. The bleeding time according to the age groups

Age (year)	n (%)	Mean ± SD (min)	Normal range (min)
35-44	116 (23.1)	2.86 ± 0.806	1.248-4.472
45-54	151 (30.0)	2.84 ± 0.823	1.194-4.486
55-64	106 (21.1)	2.79 ± 0.825	1.140-4.440
≥ 65	130 (25.8)	2.63 ± 0.635	1.360-3.900

SD: Standard deviation; $P = 0.683$ (one-way ANOVA test)

Discussion

BT is the oldest test for assessing the Plts function. This test is a quick and facile and inexpensive test. In this study, the normal range of BT in the participants was 1.23-4.35 min with a mean of 2.79 ± 0.78 min. Although, the normal range of BT is generally defined as 2-10 minutes. BT in women was more prolonged than in men. The difference between BT in blood groups was not significant. There was no significant difference between BT in different age groups. According to our knowledge, it is the first time that BT has been assessed in this amount of sample volume in Iran.

In this study, the normal range of BT in the participants was 1.23-4.35 min with a mean of 2.79 ± 0.78 min. Although, the normal range of BT is generally defined as 2-10 min. However, it is defined as < 7.1 min[4] and 1-9 min[5,6] in other references. BT in our study is in the normal reported ranges, but it is in the lower limit of reported ranges. This may due to the differences between the properties of Borujerd population and the world population. For example, Kickler reported that race and diet can affect the Plt aggregation.[2] Knowing the normal range of BT is important because reported universal ranges may misguide the physicians in dose adjustment of anti-Plts.

In our study, BT in women was more prolonged than in men. This finding is in accord with the study by Valeri et al.[7] They assessed BT in 44 healthy male and female volunteers. They reported that, at +32° C, BT in women had been longer than in men. Also, Uden et al. evaluated BT in 195 cases with scoliosis and in 318 controls.[8] They reported that BT in women had been longer than in men. Furthermore, Chen et al. stated that BT had been longer in females (26 participants) than in males (25 participants) (11.4 ± 0.9 vs. 8.3 ± 0.7).[9] Also, Roy et al. declared that in 261 medical students who participated in their study in Nepal, BT had been longer in women than in men.[10]

In our study, the difference between BT in blood groups was not significant. This finding is not in accord with the study by Caekebeke-Peerlinck et al.[11] They evaluated BT in healthy volunteers and reported that BT had been longer in individuals with blood group O than in individuals with non-O blood groups. Also, Adhikari et al. stated that BT in individuals with blood group O had been longer than in other blood groups.[12] In contrast, Mahapatra and Mishra reported that BT in blood group AB had been longer than in other blood groups.[13]

In our study, there was no significant difference between BT in different age groups. It is in contrast with Reilly and FitzGerald's study. They reported that BT had been briefer in the older applicants.[14] Also, our finding is not in accord with Jorgensen et al.'s study. They stated that the BT in men had been shortening in older participants.[15]

In our study, there was no meaningful correlation between BT and Plt count more than 150,000. Ramanathan et al. assessed the correlation between Plt count and BT in patients with preeclampsia.[16] They reported that only when Plt count was lower than 100,000/mm³, BT had been correlated with Plt count. Harker and Slichter evaluated the relationship between of BT and Plt count in the patients with thrombocytopenia with the Plt count between 10,000 and 100,000/μl. They reported that there was an inverse relationship between BT and Plt count in them.[17] None of these studies reported a correlation between Plt count more than 150,000 and BT.

Conclusion

Our study showed that the normal range of BT in Borujerd was different from normal universal ranges. Also, in this study BT was significantly different in two genders, but its correlation with age, blood group, and place of residency was not significant.

Conflict of Interests

Authors have no conflict of interests.

References

1. Valeri CR, Khuri S, Ragno G. Nonsurgical bleeding diathesis in anemic thrombocytopenic patients: role of temperature, red blood cells, platelets, and plasma-clotting proteins. Transfusion 2007; 47(4 Suppl): 206S-48S.
2. Kickler TS. Aspirin Resistance Ready for Routine Testing? Clinical Laboratory News 2007; 33(6).
3. Laffan M, Brown SA, Collins PW, Cumming AM, Hill FG, Keeling D, et al. The diagnosis of von Willebrand disease: a guideline from the UK Haemophilia Centre Doctors' Organization. Haemophilia 2004; 10(3): 199-217.
4. Kratz A, Pesce MA, Fink DJ. Laboratory Values of Clinical Importance. In: Fauci A, Braunwald E, Kasper D, Hauser S, Longo D, Jameson J, et al., Editors. Harrison's Principles of Internal Medicine. 17th ed. Philadelphia, PA: McGraw-Hill; 2008.
5. Mielke CH. Measurement of the bleeding time. Thromb Haemost 1984; 52(2): 210-1.
6. Arkin CF. Performance of the Bleeding Time Test: Approved Guideline. Villanova, PA: National Committee for Clinical Laboratory Standards; 1998.
7. Valeri CR, MacGregor H, Cassidy G, Tinney R, Pompei F. Effects of temperature on bleeding time and clotting time in normal male and female volunteers. Crit Care Med 1995; 23(4): 698-704.
8. Uden A, Nilsson IM, Willner S. Bleeding time and scoliosis. Acta Orthop Scand 1982; 53(1): 73-7.
9. Chen HI, Tang YR, Wu HJ, Jen CJ. Effects of acute exercise on bleeding time, bleeding amount and blood cell counts: a comparative study. Thromb Res 1989; 55(4): 503-10.
10. 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 Journal of Epidemiology 2011; 1(4): 135-40.
11. Caekebeke-Peerlinck KM, Koster T, Briet E. Bleeding time, blood groups and von Willebrand factor. Br J Haematol 1989; 73(2): 217-20.
12. Adhikari P, Pramanik T, Pokharel R, Khanal S. Relationship between blood group and epistaxis among Nepalese. Nepal Med Coll J 2008; 10(4): 264-5.
13. Mahapatra B, Mishra N. Comparison of Bleeding Time and Clotting Time in Different Blood Groups. Am J Infect Dis 2009; 5(2): 106-8.
14. Reilly IA, FitzGerald GA. Eicosenoid biosynthesis and platelet function with advancing age. Thromb Res 1986; 41(4): 545-54.
15. Jorgensen KA, Dyerberg J, Olesen AS, Stoffersen E. Acetylsalicylic acid, bleeding time and age. Thromb Res 1980; 19(6): 799-805.
16. Ramanathan J, Sibai BM, Vu T, Chauhan D. Correlation between bleeding times and platelet counts in women with preeclampsia undergoing cesarean section. Anesthesiology 1989; 71(2): 188-91.
17. Harker LA, Slichter SJ. The bleeding time as a screening test for evaluation of platelet function. N Engl J Med 1972; 287(4): 155-9.