COMPARISON OF BLEEDING TIME (BT) TEST RESULTS OF DUKE METHOD AND IVY METHOD IN PREOPERATIVE PATIENTS AT MM HOSPITAL. DUNDA LIMBOTO

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ABSTRACT

Bleeding Time (BT) is a laboratory test to determine the length of time the body stops bleeding due to trauma made in a laboratory manner. This test measures hemostasis and coagulation. The coagulation factor will be activated to form fibrin threads that make platelet plugs stable, therefore bleeding can be stopped. The purpose of this study was to see the comparison of the results of the bleeding time examination of the Duke method and the Ivy method. The method in this study uses a quantitative approach with a cross sectional approach. The sampling technique in this study used accidental sampling technique, assuming a total sample of 24 samples. Using univariate data analysis techniques processed through the IBM SPSS Statistic V25.0 program. The results showed that in the Duke method there were 23 respondents (95.8%) who were normal, there was only 1 respondent (4.2%) whose results were abnormal. While the results of research using the ivy method obtained the results of all 24 respondents (100%) showed normal results. Based on the Independent T Test, it can be seen that p-value = 0.000< (α) 0.05 shows that there is a significant difference between the results of bleeding time examination using the Duke method and the ivy method in preoperative patients.

Keywords: Bleeding Time section, Duke Method, preoperative Ivyn Method.

INTRODUCTION

Hemostasis comes from the Greek aimóstasiswhich consists of two words, haima which means blood, and stasis which means to remain or stop; The blood remains in the vascular system. Hemostasis is the natural ability to stop bleeding at the wound site by vascular spasm, platelet adhesion and active involvement of coagulation factors, coordination of vascular endothelium, platelet aggregation and activation of coagulation pathways [4].

It can also be interpreted that hemostasis is a normal mechanism carried out by the body to stop bleeding at the site of damage or injury [1].

In the process of bleeding from blood vessels, what happens is damage to the walls of blood vessels and the pressure inside the blood vessels is greater than the pressure outside. Therefore, there is a push of blood out of the damage. Hemostatic mechanisms inherent under normal circumstances are able to patch leaks and stop blood discharge through minor damage in capillaries, arterioles, and venules. These blood vessels are often ruptured by minor traumas that occur on a daily basis. This kind of trauma is the

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most frequent source of bleeding. The mechanism of hemostasis under normal circumstances keeps blood loss through such minor trauma to a minimum [1].

The stages or process of hemostasis are divided into three main steps, namely: (1) vascular spasm (vascular vasoconstriction), (2) platelet plug formation (primary hemostasis), (3) blood coagulation (secondary hemostasis). While the process of hemostasis will be maintained in balance through: (1) blood clotting control mechanism, (2) fibrinolysis process [22].

Platelets under normal circumstances do not adhere to the endothelial surface of blood vessels, but if this layer is damaged due to vessel injury, platelets will attach to exposed collagen, which is a fibrous protein found in the connective tissue below. When the endothelium is damaged, collagen and other sub-endothelial matrices will be exposed and will trigger platelet adhesion [22].

In vitro studies, under static conditions or slow flow in the venule circulation shows the platelet surface will be adequated with collagen, fibronectin, laminin and microfibrils. In faster flow of arteriole microcirculation collagen, fibronectin, and laminin alone are inadequate for platelet adhesion. For this reason, vWF is needed which is a complex in F VIII and synthesized by endothelial cells and megakaryocytes. vWF will bind to sub-endothelial collagen which will then bind to the surface of GPIb-IX receptors on platelets. This adhesion takes place within 1-2 minutes after tearing [23]

Hemostasis Laboratory Examination

Hemostasis is a general term to describe all mechanisms used by the body to protect itself against possible bleeding or blood loss Bleeding is the discharge of blood from its normal channels (arteries, veins or capillaries) into the extravascular space due to loss of vascular continuity. Bleeding can stop through 3 mechanisms, namely blood vessel contraction, platelet clot formation and thrombin and fibrin formation which strengthen platelet clots [1].

If there is a disorder or abnormality in one or more of the three mechanisms, abnormal bleeding occurs that often cannot stop on its own. The disorders or abnormalities can occur in: blood vessels (vascular), platelets (number and function) and clotting mechanisms [8].

With a simple examination, namely platelet count, bleeding period, clotting period, and leed rumple, it can be distinguished in outline the cause of bleeding, Bleeding period test and platelet count can also be done as a screening test for patients who will be surgical, obstetric, or tooth extraction after the prothrombin period test and partial thromboplastin period [23].

Hemostasis examination is divided into 3 (three) major groups based on their functions, namely: vascular function examination, cellular function examination and biochemical function examination. The examination of hemostasis for vascular function consists of examination of leede rumple and examination of bleeding time (bleeding time). For cellular function examination, it can be done by checking platelet count and platelet function examination using an aggregometer. While the examination of biochemical functions is done by measuring blood clotting factors, namely in intrinsic pathways such as factors XII, IX, X, VIII, V, II, I done by checking activated Partial Thromboplastin Time (aPTT). Then the extrinsic pathway measured is factor VII and X becomes Xa through Prothrombin Time (PT) examination [1].

Overview of Bleeding Time Check

The bleeding time is the time it takes for artificial bleeding to stop bleeding. As mentioned earlier, that in addition to the examination of leede rumple, the vascular ability in the hemostasis process can be done

by testing the bleeding period. Examination of the bleeding period is carried out to determine the duration of bleeding when there is injury to the capillaries [1].

Bleeding Time is a routine check performed to determine the intrinsic and extrinsic coagulation pathways. This examination has been carried out for decades using the Duke method. Ivy et al and Mielke et al. modified the method of checking bleeding time and widely used it in the mid-1980s, so questions arose regarding the validity of the examination [3].

Benefits of Bleeding Time Check

Bleeding time in clinical laboratories is useful for assessing extravascular hemostasis factors, but the condition of the capillary walls and platelet count also matter. This examination is a basic examination, if abnormalities are found, more special examinations can be carried out to look for a particular disorder [16].

Bleeding Time Examination Method

There are two methods of checking the bleeding period, namely the Duke and Ivy methods. Duke method, capillary blood vessel injury is carried out in the earlobe area, while Ivy method, injury is carried out on the volar part of the arm. Like the leede rumple test, bleeding period examination can be done to assess the vascular ability of blood vessels when bleeding occurs, but this test is also influenced by platelet count and function [2].

Examination of the bleeding period of the Duke method, piercing the capillaries in the auricle child, after the earlobe child is antisepsis using a 70% alcohol cotton swab. When drops of blood come out of the puncture area, then the stopwatch is turned on. The drops are absorbed using filter paper every 30 seconds until the wound is closed (there is no blood on the filter paper). In this method, the patient's condition is normal if the patient's wound stops for between 1-3 minutes [12].

In the examination of the bleeding period of the Ivy method, damming is carried out on the arm which will be tested using a spigmomanometer at a pressure of 40 mmHg. After damming, the voler part of the arm is antisepsis using 70% alcohol and allowed to dry. After the alcohol dries, a puncture of the voler part of the patient's arm is performed. When the first drop of blood is seen at the puncture site, the stopwatch is turned on. The drops are absorbed using filter paper every 30 seconds until the wound is closed (there is no blood on the filter paper). In this method, the patient's condition is normal if the patient's wound stops between 1-6 minutes [16].

In the Ivy method, the first drop of blood should have a diameter of 5 mm. When the diameter of the first drop < 5mm, it is feared that the puncture is less deep. If the diameter of the first drop < 5mm, then it is necessary to re-prick. Apart from the first puncture meter, a puncture that is less deep can be known when the bleeding period is less than one minute If the Ivy method bleeding period examination results are obtained more than 10 minutes, then the examination needs to be repeated. This is due to concerns about puncture of venous blood vessels when piercing the voler part of the patient's arm. If the results of the retest are still obtained bleeding period of more than 10 minutes, it can prove the presence of abnormalities in the hemostasis process [12].

Overview of Preoperative

Surgery is an invasive procedure used to establish diagnosis, treatment, disease, trauma, and deformity. The operation begins by opening the body part using an incision, after which repairs are made to the part of the body that has the problem and ends with closing the incision with suturing [17].

Preoperative is the phase where there is a decision to perform surgery and ends when the patient is transferred to the operating table. In the early stages of perioperative nursing is preoperative nursing, which is the

stage that will determine success in the next stage and if at this stage occurs the error will be fatal in the next stage [5].

Surgery is a potential and actual mental threat to a person's integrity that can evoke physiological and psychological stress reactions. Reasons that can cause patient worry / anxiety in facing surgery include: pain after surgery, physical changes, operating room, surgical equipment and attendants, death during surgery / unconsciousness, and surgery failure.

Some of the things that cause anxiety before surgery and anesthesia are: unfamiliar environment, cost problems, threat of more severe disease, medication problems, and health education [9].

RESEARCH METHODOLOGY

The type of research used is quantitative research with a cross sectional approach, using dependent variables (Duke method and Ivy method) and independent variables (bleeding time = BT) which are carried out at once and measured at the same time [19].

The design in this study is an analytical research design. Analytical Research to describe and find differences (bleeding time = BT) using (two) different methods, namely the Duke method and the Ivy method.

The study will be conducted in August 2023 for 3 weeks. The location of the research will be carried out in the Surgical Treatment Room of M.M. Dunda Limboto Hospital, Gorontalo Regency.

Primary data is data obtained directly from research subjects by wearing measurement tools or data collection devices, directly on subjects as sources of information sought. The primary data of this study was obtained in 2 (two) ways, namely: 1) distributing questionnaires as well as conducting direct interviews with respondents who will perform surgery (pre-surgery) and 2) conducting laboratory tests, namely checking the bleeding time (BT) with 2 (two) different methods, namely the Duke method and the Ivy method.

Secondary data is data obtained through other parties, not directly obtained by researchers from their research subjects. Secondary data are obtained from library data, related research literature, as well as medical record data / data from the surgical room (operating room) and laboratory register books.

The population in this study was all patients who were in the surgical treatment room of M.M. Dunda Limboto Hospital, Gorontalo Regency.

The samples in this study were patients who were in the room undergoing surgery (preoperative) at M.M. Dunda Limboto Hospital, Gorontalo Regency, with a sample of 24 people, according to the results of the sample size formula.

The sampling technique used in this study is using Nonprobability Sampling Sampling. Accidental Sampling is a technique that determines samples by chance, anyone who meets the researcher by chance if the person met by data In this case when the researcher conducts research and meets respondents who will be operated in the surgical room (operating room) of M.M. Dunda Limboto Hospital, Gorontalo Regency, to be used as respondents [19].

The independent variable is the variable that affects the independent variable in this study is the result of the bleeding time examination.

The instruments of this study are 70% alcohol cotton, stopwatch, filter paper, spigmomanometer, lancet and observation damp.

Informed Consent in the form of a consent sheet to be signed by respondents who are willing to be the object of research.

Analysis carried out manually using Statistical Product and Service Solutions

(SPSS) Test version 26.0 is an application or computer program that is useful for making various types of statistical analysis. In this study using univariate and bivariate statistical analysis.

The data in this study is presented in the form of a frequency distribution table based on the variables studied and then narrated.

RESEARCH FINDINGS

One of the objectives of respondent characteristics is to provide a picture of respondents who are sampled in this study which are grouped according to age and gender. From the results of data collection through observation sheets that have been carried out in August 2023 with a research sample of 24 respondents, it can be seen in the following table:

Table 4.1. Distribution of Respondents' Characteristic Frequency by Age and Type of Animal

Keterangan responden	N	%
Umur		
Remaja Akhir (17-25 tahun)	11	45,8
Dewasa Awal (26-25 tahun)	6	25
Dewasa Akhir (36-45 tahun)	2	8,3
Lansia Awal (46-55 Tahun)	2	8,3
Lansia akhir (56-65 tahun)	3	12,5
Jenis Kelamin		
Laki- Laki	16	62,5
Perempuan	9	37,5
Total	24	100

Source: Primary Data, 2023

Based on Table 4.1 of the frequency distribution of respondents by age, each age group is most in late adolescents (17-25 years) as many as 11 respondents (45.8%), then early adulthood (26-35 years) there are 6 respondents (25%), late elderly (56-65 years) there are 3 respondents (12.5%), at least in late adulthood (36-45 years) and early elderly (46-55 years) where there are 2 respondents each (8.3%). While in gender characteristics, dominated by men as many as 15 respondents (62.5%) and women there are 9 respondents (37.5%).

Univariate Analysis

Table 4.2. Duke Method Bleeding Time Frequency

Bleeding Time Metode Duke	N	%
Normal (1-3 menit)	23	95,8
Abnormal (<1 menitatau>3 menit)	1	4,2
Total	24	100

Source: Primary Data, 2023

Based on Table 4.2 above shows that the results of bleeding time research with the Duke method on respondents totaling 24 people, there were 23 respondents whose results were normal (95.8%) and there was only 1 respondent whose results were abnormal (4.2%).

Table 4.3. Frequency Bleeding Time Ivy Method

Bleeding Time Metode Ivy	N	%
Normal (1 – 6 menit)	24	100
Abnormal (<1 menit atau> 6 menit)	0	0
Total	24	100

Source: Primary Data, 2023

Based on Table 4.3 above shows that the results of bleeding time research with ivy method on respondents totaling 24 people, all respondents found normal results (100%).

Analisis Bivariat

Bivariate analysis in this study aims to see the comparison of the results of bleeding time examination of Duke method and ivy method in preoperative patients at MM Hospital. Dunda Limboto. Before performing bivariate analysis, the assumption of data normality must be met to determine whether the data is normally distributed or not. The normality test in this study used the Shapiro Wilk test. The analysis was used to determine the comparison of the results of the Duke method bleeding time examination and the ivy method in

preoperative patients using the Independent T Test with a significant < (α) of 0.05.

Table 4.4. Data Normality Test Results

Bleeding Time	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Metode Duke	**0,250**	**24**	**0,004**	**0,681**	**24**	**0,014**
Metode Ivy	**0,165**	**24**	**0,9**	**0,297**	**24**	**0,086**

Source: Primary Data, 2023

Based on Table 4.4 of the results of data normality test processing with the Shapiro Wilk method, it is known that the significant value for the duke method is 0.014 > (α) 0.05 and the significant value for the ivy method is 0.086 > (α) 0.05, it can be concluded that the residual value of the duke method and the ivy method is normally distributed.

Tabel 4.5. Hasil Uji Homogenitas

Levene Statistic	df 1	df2	Sig
0,626	4	15	0,651

Source: Primary Data, 2023

Based on the results of Table 4.5 data, homogeneous values can be seen in the sig table. If the significant value > 0.05 then the data can be said to be homogeneous. The table above shows significance at 0.651 > 0.05 so the data is homogeneous.

Table 4.6. Independent T Test Results

	Kadar Gulad Darah (mg/dl)Mean ± SD	Mean 95% CI		t-test	*p-value*
		Lower	Upper		
Metode duke	1,925 ± 0,7231	-2,4912	-1,3130	-6,499	0,000
Metode Ivy	3,827 ± 1,2381				

Source: Primary Data, 2023

Based on Table 4.6, the average result of bleeding time examination using the Duke method is 1 minute 9 seconds, while the average result of bleeding time examination using the ivy method is 3 minutes 8 seconds. Based on the Independent T Test, it can be seen that p-value = 0.000 < (α) 0.05 shows that there is a significant difference between the results of bleeding time examination using the Duke method and the ivy method in preoperative patients.

DISCUSSIONS

In women, maximum (194 seconds) and minimum (145 seconds) BTs are observed in the age range from adolescence to the elderly. The results showed that there was no significant association between BT and different age groups in women. However, BT was prolonged in subjects older than 64 years. The normal range of BT in this study (1-3.5 minutes) was markedly different from the international normal range. Whereas in men, BT decreases with age [21].

Gender is one of the factors influencing BT, i.e. greater values are observed in women. Other researchers have shown that BT declines with age. Although the results of this study fit this theory, the results were not similar in women. Other factors that can prolong BT include white blood cell (WBC) and red blood cell (RBC) counts, chronic kidney disease, anemia, connective tissue abnormalities (such as Ehlers-Danlos syndrome). In addition, some types of foods, vitamins and spices such as ginger, ginger, red onions, vitamins E and C, and white onions, produce abnormal agregafibrocytes and BT. Drugs such as aspirin and beta-lactam antibiotics (penicillins and cephalosporins), nonsteroidal anti-inflammatory drugs, cardiovascular drugs, psychotropic drugs (amitriptyline and haloperidol), nalgesic and narcotic drugs, chemotherapy drugs, antihistamines can also cause abnormal BT.

Lastly, diseases such as Bartter's syndrome, asthmaatopy .

Sutor believes BT could be applied as a screening test in patients with bleeding symptoms. Besides, this test can be used as a single test in children to provide the best information because in this age group, primary dysfunction of homeostasis is more common than coagulopathy. He stressed that standard techniques should be used and the limitations of these tests should also be considered. To evaluate the effect of UHU on closing time (CT) and BT tests, Valeri et al. studied 54 healthy female and male volunteers in the age range of 19-35 years. Their participants had no history of taking any medications. People's skin temperature changes between 20-38°C. A blood sample is taken from the anterior part of the arm. At each temperature, complete blood cell count (CBC), BT, and A2 thromboxane levels were assessed in serum and plasma. BT was tested on 38 volunteers and CT was conducted on 16 volunteers. The results showed that at skin temperatures above 32°C, BT was longer and hematocrit l .

Based on the results of respondents' research based on age, each of the most age groups is in late adolescents (17-25 years) as many as 11 respondents (45.8%), then early adulthood (26-35 years) there are 6 respondents (25%), late elderly (56-65 years) there are 3 respondents (12.5%), at least in late adulthood (36-45 years) and early adults (46-55 years) where there are 2 respondents (8.3% each). The results of this study are in line with the study entitled Overview of the Results of the Faal Hemostasis Examination at Sanglah Hospital, Bali, Indonesia, which shows the results that the most respondents are found in adolescent to adult respondents.

The results of the study in the sex group obtained results dominated by men as many as 15 respondents (62.5%) and women there were 9 respondents (37.5%). The results also showed the fastest bleeding time was in respondents with male sex. These results are in line with an earlier study entitled Determination of the Normal Range of Bleeding Time in Rural and Urban Residents in Borujerd, Iran. Roohafza showed that 80% of the respondents were male.

As mentioned earlier, the BT test is used to evaluate platelet function in the human body. Despite the drawbacks of this test such as weak reproducibility, invasiveness, insensitivity, time consumption, and inability to predict bleeding risk in patients undergoing surgery, it is currently widely used for the evaluation of platelet function. In addition, the BT test is used to assess platelet function, the effect of drugs and medical devices on homeostasis status. The most important advantage of the BT test is its ability to check the normal homeostasis of the body and the role of blood vessels in this process. Besides, expensive equipment is not required to perform this test. temperature, exercise, anxiety, incisions longer than I tanstandar, and excessive cleaning of the test area, individual differences in participants, type of device used, and age were also found to alter BT [11].

Based on the results of bleeding time research with the Duke method on 24 respondents, there were 23 respondents whose results were normal (95.8%) and there was only 1 respondent whose results were abnormal (4.2%). While bleeding time with the ivy method in 24 respondents, all respondents obtained normal results (100%).

This result is in line with a previous study entitled Bleeding Time which showed the results that all respondents who were bleeding time using the ivy method were normal. Duke's method is less burdensome to

the hemostasis mechanism because there is no damming, the results of examination according to the Ivy method are more reliable. Duke's method should only be used on infants and young children, because wearing a figmomanometer tie on the upper arm is impossible or difficult to do. However, based on experience during laboratory practice in the field, most hospitals use the Duke method for bleeding time checks at all ages for the reason of making time effective because the Duke method can be done in a faster time, and for the convenience of patients because patients will feel sore during the containment process using the Ivy method [10].

Bleeding Time examination (bleeding time) is a screening examination (filter) to assess platelet function disorders and detect von Willebrand abnormalities. This examination is directly influenced by platelet count, especially below 50,000/mm3, thrombosi ability to form plugs, vascularization and blood vessel constriction ability. The coagulation mechanism does not significantly affect the bleeding time unless there is a sufficiently severe decrease. Bleeding Time examination (bleeding time) should not be done if the patient is taking anticoagulants or anti-pain aspirin, because it can cause prolonged bleeding time. Treatment should be delayed for 3-7 days or, if possible, the patient should be told not to take aspirin or over-the-counter painkillers for 5 days prior to the examination[14].

Bleeding Time (BT) is a laboratory test to determine the length of time the body stops bleeding due to trauma made in a laboratory manner. This test measures hemostasis and coagulation. The bleeding period depends on the appropriateness of tissue fluid in spurring coagulation, capillary and platelet blood vessel function. This examination is mainly about platelets, namely the number and ability to adhesion to subendothelial tissue and form aggregations [7].

Factors that can affect the time of bleeding during the examination are inappropriate preparations at the preanalytic, analytical and post-analytical stages can affect the results of the bleeding period examination. At the preanalytical stage, the preparation of tools and materials needs to be considered, the autoclick function is good, the sphygmomanometer function in the Ivy method must be ensured to be good. The thing that needs to be considered at the analytical stage is the selection of the place of stabbing. The place of stabbing in the Ivy method, must be ascertained not the area where the veins are, because if the veins are punctured, the bleeding period will extend. The results of the examination for more than 10 minutes need to be retested because it is feared that there will be a puncture of a vein. If the results of the retest are indeed more than 10 minutes, then indeed the patient's bleeding period is prolonged. In the Ivy method, the diameter of the first drop of blood should be at least 5 mm. If the first drop of blood is less than 5 mm, it is feared that the stabbing is less dala .

The study was conducted in Gorontalo Regency and the sample examination site at Dr. M.M. Dunda Hospital for 3 (three) weeks using the Accidental Sampling method as a sampling technique. From the initial data obtained, researchers conducted bleeding time examinations on 24 patients or preoperative respondents. Furthermore, researchers

conducted a bleeding time examination using the duke method first by cleaning the earlobe first using a 70% alcohol cotton, then the earlobe was pierced using a lancet until the blood came out then the stopwatch was immediately turned on. Every 30 seconds the blood coming out of the earlobe is collected using filter paper on each blank part of the filter paper that has not been stained with blood, avoiding exposure to the puncture part. When the blood stops dripping, the stopwatch is stopped. The time on the stopwatch is recorded or the number of droplets on the filter paper is calculated through .

Based on the results at the research site, that from 24 samples taken bleeding time examination using the duke method and ivy method in preoperative patients at Dr. M.M. Dunda Hospital, there were 23 respondents (95.8%) who were normal shown in the sample code DM, GR, NRD, RK, AI, FHM, HS, SA, MI, U, ML, AK, IH, FD, SK, OH, MH, MS, AZL, NH, RD, NS, and AR. Then there was only 1 respondent (4.2%) whose abnormal results were shown in the SM sample code. While the results of research using the ivy method obtained the results of all 24 respondents (100%) showed normal results shown in the sample code DM, GR, NRD, RK, AI, FHM, HS, SA, MI, U, ML, AK, IH, FD, SK, OH, MH, MS, AZL, NH, RD, NS, AR and SM.

The results of this study are in line with the results of previous studies by the results of the normal Ivy method bleeding time examination as many as 76 people (100%). No abnormal test results were obtained. The normal Duke method bleeding time test value of 76 people (100%), no abnormal test results were obtained.

According to the researchers' assumption, there was a lengthening of the bleeding time of this study using the Duke method, this was due to the possibility of several factors such as blood vessel abnormalities or platelets. History of the use of drugs that can interfere with platelet function such as aspirin also needs to be explored further.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that from 24 samples taken, bleeding time examination using the Duke method and the ivy method in preoperative patients at the hospital. Dr. M.M. Dunda, can be summed up as follows:

1. The results of the study on the Duke method were 23 respondents (95.8%) who were normal, there was only 1 respondent (4.2%) whose results were abnormal.
2. The results of the study using the ivy method obtained the results of all 24 respondents (100%) showed normal results.
3. Based on the Independent T Test, it can be seen that p-value = 0.000 < (α) 0.05 shows that there is a significant difference between the results of bleeding time examination using the Duke method and the ivy method in preoperative patients.

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