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Determining Estimation Factor For Platelet Count Using Microscope With Field Number (Fn) 18

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Abstract-The estimation number of platelets has been determined based on the method of Barbara Brown (1976), namely multiplying the average platelet count per field of view of 100x objective enlargement with a number of 20,000/mm^3. Modern microscope ocular lenses show a wide field of view, so the platelets will clearly be visible. The platelet count estimation factor will be more precise if it is determined based on the Field Number (FN) of the microscope. This study used EDTA blood samples to count the platelet counts using the Sysmex XS800i automatic cell counter, followed by making a blood smear and Wright's stain. To determine the mean platelet rate per objective field of view of 100x in zone V using an Olympus CX21 microscope. Furthermore, the ratio of platelet numbers and the average number of platelets per field of view was determined for each sample. The estimation factor is the total ratio obtained divided by the sample size. The number of samples is 64 samples. The estimation factor for the number of platelets obtained is 22, meaning that 1 platelet per field of view is equivalent to 22 x 109/L. Platelet count estimation can be used for reporting platelet count results if there is no equipment available for platelet count with the estimation factor according to the FN microscope.

Keywords: estimation factor, total ratio

I. INTRODUCTION

Examination of blood cell counts, especially leukocytes and platelets, is in demand in many clinics. This is due to the increasing need for such data in an effort to help make a diagnosis. With the increasing demand for blood cell count checks, manual cell count checks can no longer meet these needs. Therefore, an automatic cell counter was made. With an automatic cell counter, cell counting becomes easier, faster and more accurate than the manual method. [1]

Platelets are difficult to count because they break easily and are difficult to distinguish from small stools. Because of the difficulty of calculating, the assessment of the number of platelets in the blood film is very important as a screening examination. [2]

So far, the estimation of the number of platelets is determined based on an old method modified by Brown [3], which is the result of multiplying the average platelet count per field of view of 100x objective enlargement with a number of 20,000/mm^3. This method applies to normal, low and high platelet counts.

Based on Good Laboratory Practice (GLP), in principle, all platelet count results that are checked with automatic or manual counters must be cross-examined on the peripheral blood smear to confirm the increase or decrease of platelet count. With the aim of knowing whether there is a difference between the results of the platelet count and the estimated platelet count. [4]

Rohmawati has conducted research on determining the estimation factor for the number of platelets in the peripheral blood smear of thrombocytopenic patients in 2003 [5]. She suggested that the estimation of the platelet count could be used for reporting the results of the platelet count if there is no platelet counting equipment available, with the estimation factor in accordance with the field number (FN) microscope. The estimation factor is determined based on the total ratio between the number of platelets according to the instrument used to the average platelet count per sample size field.

The examination of platelet count is also carried out at a clinical laboratory P, which is one of the largest laboratories in Indonesia. The recognition as the best laboratory is proven by the company success in obtaining ISO 15189 accreditation (special international accreditation for medical laboratories) and the results of External Quality Assurance with the best national ranking, even in 2011 this laboratory was ranked 10th internationally out of 2808 participating laboratories from around the world [6].

II. METHODS

This type of research is a descriptive study with a cross sectional approach method. The automatic cell counter method of platelet count research was conducted at the Prodia Clinical Laboratory, at Jalan Basuki Rahmat number 801 Palembang. Meanwhile, the research to estimate platelets for peripheral blood smears using a FN 18 microscope was conducted at the Pakjo Health Center, at Jalan Inspektor Marzuki number 2240 Palembang.

The collected data were processed and analyzed by calculating an estimation factor based on a formula that took into account the number of platelets according to the automatic cell counter and the average platelet count per immersion field using an FN 18 microscope.

III. RESULT

Table 1
Number of platelet by a*utomatic cell counter*

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std.	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
automatic	64	447	58	505	18872	294,88	11,196	89,570	8022,841
Valid N (listwise)	64								

The lowest automatic cell counter platelet count results were 58 x 10^9/L and the highest was 505 x 10^9/L, the mean platelet count was 294.88 and the standard deviation was 89.570.

Table 2
Average number of platelet on blood smears

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std.	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
ratarata	64	22,20	3,80	26,00	865,48	13,5231	,52035	4,16280	17,329
Valid N (listwise)	64								

The mean value of platelets per field of view was obtained by counting the number of platelets in 10 immersion fields of view then divided by the number of visual fields, namely 10. The smallest number of platelets was 3.80 and the highest was 26.00. The average number of platelets was 13.5231 and the standard deviation was 4.16280.

Table 3
The estimation factor for the FN 18 microscope

Sample Size	The total ratio of platelet count
64	1395.14

The data above were then calculated to find the estimation factor using this formula.

$$\frac{\text{the number of total ratio of platelet count to platelet estimation number}}{\text{the number of samples}}$$

From this formula, the estimation factor for the FN 18 microscope is 22. It means that 1 platelet in the 100x-objective field of view is equivalent to platelet of 22 x 10^9/L.

IV.DISCUSSION

The estimation factor that has been known from this study is the same as the previous research, namely 22. This estimation factor is then applied to determine the estimation of the number of platelets in the peripheral blood smear. For example, if the mean platelet count per field of view is 10, then the estimated platelet count = 10 x 22 x 10^9/L = 220 x 10^9/L.

The importance of knowing this estimation factor is to determine the error of platelet count examination using automatic cell counter and peripheral blood smear. If there is a large difference between the two, it should be noted that there is a possibility of errors in platelet recognition tools, for example platelet aggregation, giant platelets and so on. Other possibilities come from pre-analytic, analytic and post-analytic processes. The examples of pre-analytic errors are swapped samples and errors in writing identities or clots on samples. Analytical errors can occur when the peripheral blood smear does not meet the requirements or if the measuring instrument used is damaged. Post-analytic errors, for example, are errors in writing the platelet count results.

The laboratory can use the estimation factor of 22 to determine the estimation number of the platelet count using an FN 18 microscope. Laboratories that use a microscope with different FN should use a different factor for estimating the platelet count. The estimation of the platelet count can be used to report the results of the platelet count if there is no platelet count facility provided that it is carried out by medical technologists who have adequate knowledge and training.

V. CONCLUSION

From this study, it was found that the estimation factor for the number of platelets in the peripheral blood smear that was determined using the Sysmex XS800i counter and the Olympus CX21 microscope with FN 18 was 22.

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