Original Article

Reference Values of Platelet Indices for Adult Patients from Out-Patient-Department, King Chulalongkorn Memorial Hospital

Viroj Wiwanitkit

Department of Laboratory Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok

Abstract: *The reference values of platelet indices for patients were determined using an automated blood cell analyzer, Coulter-STKS in King Chulalongkorn Memorial Hospital. A total of 400 healthy subject in 4 different physiological status: male adult, female adult, pregnant subject and elderly subjects were included in this study. The parameters included platelet count and mean platelet volume. The reference ranges were established by setting the reference limits at two standard deviations from the arithmetic reference mean.*

Key Words : ● *Platelet indices* ● *Platelet count* ● *Mean platelet volume*

Thai J Hematol Transf Med 2001;11:163-6.

Blood cell indices are ones of the most valuable tests. In the present day, not only manual method but also the automatic method[1] can be selected in order to determine blood cell indices. Recent technological advances led the way to development of blood cell analyzers capable of performing an accurate, precise, and complete analysis of blood cell indices.

The indices are important for diagnosis of hematological diseases. Many laboratories have been using automated equipment to perform the blood count. However, the reference range should not be taken from the established texts, but derived from a carefully chosen reference population. The univariant reference ranges for a laboratory with a specific automated system will be unique to that laboratory, the system and the local population.

Not only in healthy adult that the reference range of tests should be set but also other spe-

cific groups such as the pregnancies and elderly. From review literature, there has been no report about automated reference range of platelet indices for the Thais. The objective of this study is to establish the reference values for platelet indices using an automated blood cell analyzer, Coulter-STKS, based on the theory of reference ranges recommended by the International Committee for Standardization in Hematology (ICSH)[2, 3]. The studied platelet indices included platelet count and mean platelet volume (MPV).

Material and Method

Four hundred healthy subjects who received routine laboratory screening test check-up at Out-Patient Division, King Chulalongkorn Memorial Hospital were included in this study. The 4 major different groups of subjects in this study were 100 male adult subjects, 100 female adult subjects, 100 pregnant subjects and 100 elderly subjects. Adult was defined as subject age between 15-60 years old and elderly subject was defined as subject age over 60 years old. Pregnant subjects in this study were determined as subjects at antenatal clinic and had already gotten pregnancy confirmation test. The exclusion criteria were that the subjects who had any history of illness likely to influence the complete blood count (CBC), especially for diseases affecting platelet indices such as ITP, SLE and etc. In case that anemia was found using criteria of anemia, they were also excluded.

Blood samples of the healthy subjects were drawn from the antecubital vein of sitting subjects into tripotassium ethylene diamine tetra-acetic acid (K_3EDTA) using evacuated blood collection system. All samples were stored in the room temperature and then analyzed by a Coulter-STKS. The system was calibrated and operated in accordance with the manufacturer's operating instruction. All experiments were performed at the room temperature.

The instrument used in this study, Coulter - STKS, is an automated blood cell analyzer that performs CBC using electrical impedance system. Platelet indices including platelet count and mean platelet volume (MPV) were determined in this study.

The reference ranges[4] were estimated by 95 percent confidence interval for two-tailed tests. The lower and upper limits of each constituent were calculated by mean±SEM (standard error of sample mean). The Za = 0.05 for two-tailed tests equals 1.96.

Results

A total of 400 healthy pregnant subjects were analyzed in this study. The reference ranges and average reference parameters of each parameter provided by the Coulter-STKS was shown in Table 1.

Discussion

In the present day, the used of automatic machine in laboratory is widespread[56]. One of its advantages is decrease turn-around time in process. Many laboratories have been using

Table 1. The platelet count, mean platelet volume and 95% confidence interval (CI) are shown in 4 age groups.

Group	Platelet count (cells/microliter)		Mean platelet volume (femtoliter)	
	mean	95% CI	mean	95% CI
Male adults	234.84	182.13-287.58	7.70	6.72-8.68
Female adults	229.60	170.53-288.67	7.64	6.14-9.14
Pregnant subjects	224.90	168.09-281.71	7.75	6.70-8.80
Elderly subjects	228.71	174.32-231.10	7.81	6.34-9.28

automated equipment to perform the complete blood count. However, most of reference values in the textbook are derived from manual method. Because the principle and method are different, automated derived references should be determined. Due to the fact that reference values are system-specific, they should be establish for each laboratory[4]. Furthermore, hematological variables are affected by many physiological and pathological changes. Therefore, establishment of reference range in each group of population is necessary.

This study established the reference ranges for platelet indices on the electrical impedance system, using Coulter-STKS. The reference ranges for platelet parameters for the Thais on the automated hematology machine, Coulter-STKS was established.

There are many diseases, especially hematological disorders, that platelet indices can be useful in diagnosis, treatment and follow-up. Surprisingly, there was no report about the reference in hematology for the Thais. Therefore, the reference values in this study can be useful as baseline data as an efficient tool for physicians.

Comparison of reference values in each group to one another, it revealed that there are some differences. This fact implies the importance of reference ranges in each specific group. Interpretation of laboratory results should base on group-specific references. Finally, due to the fact that the reference values are varied due to geography, recommendation for evaluation for each laboratory test available in Thailand is set.

References

1. Ruppaport ES, Helbert B, Beissner RS, Trowbridge A. Automated hematology: where we stand. South Med J 1988;81:365-70.

2. International Committee for Standardization in Haematology (ICSH). The theory of reference values. Clin Lab Hematol 1981;3:369-73.

3. International Committee for Standardization in Haematology (ICSH). Standarization of blood specimen collection procedure for reference values. Clin Lab Hematol 1982;4:83-6.

4. Solberg EK. Statistical treatment of collected reference values and determination of reference limits. In:

Grasbeck R, Alstrom W, eds. Reference Values In Laboratory Medicine. Chichester: John Wiley, 1981.

5. Saw D, Tham KT. Medical practice clinical applications of an automated haematology analyser. J Hong Kong Med Ass 1988;40:219-22.

6. Nelson DA, Morris MW. Basic examination of blood. In: Henry JB, ed. Clinical Diagnosis & Management by Laboratory Methods. Philadelphia: WB Saunder, 1991:553-603.

ค่าอ้างอิงสำหรับดัชนีเกร็ดเลือดสำหรับผู้ป่วยผู้ใหญ่ที่มาตรวจที่หอผู้ป่วยนอก โรงพยาบาลจุฬาลงกรณ์

วิโรจน์ ไววานิชกิจ

ภาควิชาเวชศาสตร์ชันสูตร คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย กรุงเทพมหานคร

บทคัดย่อ: *ได้ทำการศึกษาค่าอ้างอิงของดัชนีเกร็ดเลือดในคนไทยด้วยเครื่องตรวจวิเคราะห์เลือดอัตโนมัติ Coulter-STKS โดยทำการศึกษาจากกลุ่มตัวอย่างจากโรงพยาบาลจุฬาลงกรณ์ จำนวน 400 ราย ในสภาวะทางสรีรวิทยาพื้นฐานที่แตกต่างกัน 4 กลุ่มคือ กลุ่มผู้ใหญ่เพศชาย กลุ่มผู้ใหญ่เพศหญิง กลุ่มสตรีตั้งครรภ์ และกลุ่มผู้สูงอายุ ค่าที่ทำการศึกษาประกอบด้วยค่านับของเกร็ดเลือดขาว และค่าเฉลี่ยปริมาตรของเกร็ดเลือด ค่าอ้างอิงกำหนดขึ้นโดยครอบคลุมตัวอย่างร้อยละ 95 โดยใช้ค่ามัชฌิมเลขคณิตบวกและลบด้วยสองเท่าของค่าส่วนเบี่ยงเบนมาตรฐาน*

Key Words : ● *Platelet indices* ● *Platelet count* ● *Mean platelet volume*

วารสารโลหิตวิทยาและเวชศาสตร์บริการโลหิต 2544;11:163-6.