Comparative Study Between Westergren and Erythrocyte Sedimentation Pipette Method for Determination of Erythrocyte Sedimentation Rate

ATCHASAI SIRITANTIKORN, M.Sc.*,
VIROJ WIWANITKIT, M.D.*

Abstract

A comparative study between standard Westergren and erythrocyte sedimentation pipette (Sediplast^R) methods for determination of erythrocyte sedimentation rate was performed on 80 individual subjects. From the study, the comparison-of-methods plot Sediplast^R method (X) *vs* Westergren method (Y) gave the least square linear regression equation of Y = 1.001 X - 2.24 (r = 0.99). Precision analysis gave a coefficient of variation below 3 per cent. The new erythrocyte sedimentation pipette method seems to be an effective and safe method for erythrocyte sedimentation rate determination in the present day.

Key word : Erythrocyte Sedimentation Rate, Westergren Method, Pipette

SIRITANTIKORN A & WIWANITKIT V
J Med Assoc Thai 2001; 84: 422-425

Suitable and effective techniques of erythrocyte sedimentation rate determination have been necessary for the success of laboratory processes. Several methods of erythrocyte sedimentation rate determination have been developed[1]. Among these techniques, Westergren method is accepted as the standard method[1,2] and has been widely used in Thailand.

Although the Westergren method has been popular for its many advantages, the risk of the practitioner in contact with blood specimens, which can lead to blood-borne infection, is still high. In the present day, many new methods for determination of erythrocyte sedimentation rate have been developed to decrease the risk[3]. Erythrocyte sedimentation pipette is an example of the newly developed equipment. Based on the principle of pipette, erythrocyte sedimentation rate can be easily performed. In the present day, this new method is used in Thailand, but there is no report about the efficacy of this new method. Therefore, this study was set in order to be a pilot study to compare this new method to the Westergren method for determination of erythrocyte sedimentation rate.

* Department of Laboratory Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand.

MATERIAL AND METHOD

This study was carried out in the Laboratory Medicine Department, Faculty of Medicine, Chulalongkorn University in 1998. 80 individual volunteer subjects were included. For each subject, two methods for erythrocyte sedimentation rate determination were performed. The first method was the Westergren method[1] as a standard method and the second was the erythrocyte sedimentation pipette (Sediplast^R) method. The Sediplast^R method was the new method making use of the fluid pressure principle-collected blood which can be automatically sucked from the stopper into the erythrocyte sedimentation tube without usage of rubber suction. The erythrocyte sedimentation rate for each sample was read and recorded at 1 hour.

Table 1. Characteristics of samples used in the study.

Assays	Values (millimeter/hour)
Westergren method	33.63 ± 23.55
Sediplast^R method	33.65 ± 23.81

All recorded data were collected, analyzed and interpreted. Linear regression was performed in order to assess significant difference in the erythrocyte sedimentation rate obtained by the Westergren and Sediplast^R methods.

RESULTS

All 80 samples were analyzed for erythrocyte sedimentation rate by the Westergren and Sediplast^R methods. The data from this study are summarized in Table 1. The comparison-of-methods plot Sediplast^R method (X) *vs* Westergren method (Y) gave the least square linear regression equation of Y = 1.001 X - 2.24 (r = 0.99) (Fig. 1). Precision analysis gave a coefficient of variation below 3 per cent.

DISCUSSION

Erythrocyte sedimentation rate[1] is an important laboratory investigation in medicine. Although it is a non-specific parameter, it can help physicians diagnose and follow-up many diseases. Therefore, a number of methods for erythrocyte sedimentation rate determination have been performed.

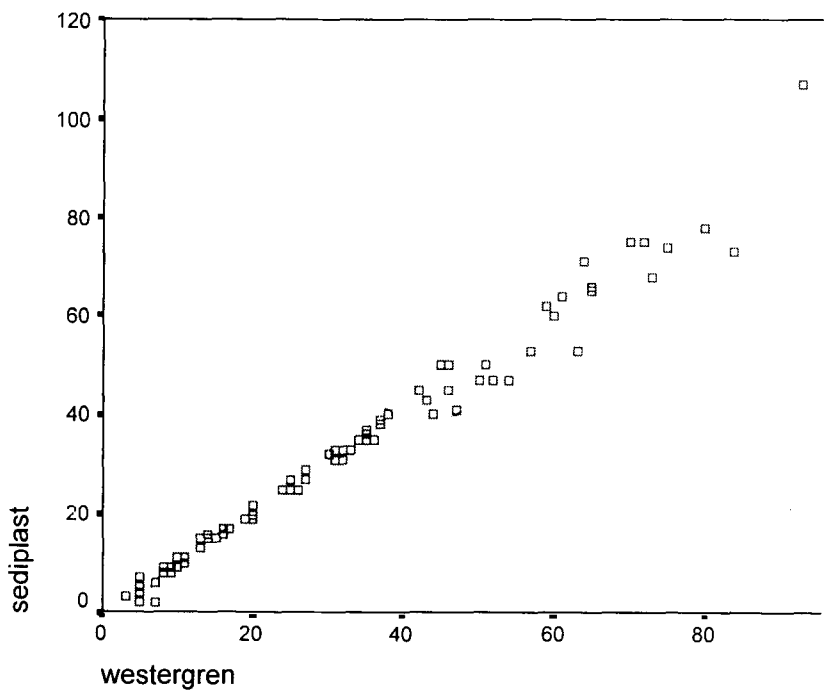

Fig. 1. Comparison of standard Westergren and erythrocyte sedimentation pipette (Sediplast^R) method for erythrocyte sedimentation rate determination.

The Westergren method[1,2] is the method accepted as the standard method in the present day but there are some limitations to this technique. Firstly, it is an open method, therefore, practitioner have to contact the blood specimen directly. In the present day, there are a number of blood-borne pathogens, which cause diseases, especially hepatitis and HIV infection. Furthermore, the classical Westergren erythrocyte sedimentation tube was made of glass and washing for further use must be done. Hazards not only from possibly damaged glassware but also contaminated blood can be expected. Therefore, it seems not applicable to the setting that blood borne infection is rather high and it does not match the concept of laboratory safety.

Therefore, a number of methods have been developed to overcome these problems. The erythrocyte sedimentation pipette (Sediplast^{R}) method is a new method based on the principle of fluid pressure, by pouring the collection of blood into the stopper and then pushing the erythrocyte sedimentation tube into it can make the test. With the principle of fluid pressure, blood will be sucked into the test tube and then sedimentation will occur. The equipment set is made of plastic and not reusable so biohazard from blood contamination can be avoided.

From this study, it was revealed that usage this new technique can provide very good correlation (r = 0.99). Therefore, it can be a potentially useful tool in performing erythrocyte sedimentation rate determination especially in a setting where the rate of blood–borne infectious diseases is rather high such as in Thailand[3].

However, there are still some limitations with this new method. Firstly, It is also an open method, therefore, risk to the practitioner of contact with blood specimens may occur while pouring a collected blood sample into the stopper. Another problem that can be expected is due to the principle of fluid pressure of the test, therefore, if pushing the test tube into the stopper is not completely done, the test cannot be completely performed.

This study is only a pilot type in one specific laboratory setting. Some variables of the test due to the setting can be expected. Therefore, further studies in a multi center should be performed.

(Received for publication on October 13, 1999)

REFERENCES

1. Ravel R. Miscellaneous diagnostic procedures. In: Richard R, editor. Clinical Laboratory medicine. 1st ed. Maryland: Williams & Wilkins 1994: 179–82.
2. Thomas RD, Westergard JC, Hay KL, et al. Calibration and validation for erythrocyte sedimentation rate tests. Roles of the International Committee on standardization in Hematology reference procedure. Arch Pathol Lab Med 1993; 117: 719–23.
3. Wongsena W, Kunakorn M, Tanprasert S, et al. Detection of HIV–1 window period infection in blood donors using borderline anti-HIV results, HIV-1 proviral DNA PCR, and HIV-1 antigen test. J Med Assoc Thai 1997; 80: S112-5.

การศึกษาเปรียบเทียบการหาอัตราการตกตะกอนของเม็ดเลือดแดงด้วยวิธีเวสเทอร์เกร็นและวิธีใช้หลอดดูด

อัชฌาสัย ศิริตันติกร, วท.ม., วิโรจน์ ไววานิชกิจ, พ.บ.**

ได้ทำการศึกษาเปรียบเทียบการตรวจวัดอัตราการตกตะกอนของเม็ดเลือดแดงด้วยวิธีมาตรฐานเวสเทอร์เกร็นและวิธีใหม่ที่ใช้หลอดดูดพร้อมฐานรองสำหรับหาอัตราการตกตะกอนของเม็ดเลือดแดง (Sediplast®) ในตัวอย่างจำนวน 80 ราย จากการศึกษาพบสมการถดถอยเชิงเส้นกำลังสองน้อยที่สุดระหว่างวิธี (Sediplast®) และ วิธีเวสเทอร์เกร็น (Y) ได้สมการดังนี้ Y = 1.001 X – 2.24 (r = 0.99) และจากการวิเคราะห์ความแม่นยำพบสัมประสิทธิ์ของความแปรผันต่ำกว่าร้อยละ 3

คำสำคัญ : อัตราการตกตะกอนของเม็ดเลือดแดง, วิธีเวสเทอร์เกร็น, หลอดดูด

อัชฌาสัย ศิริตันติกร, วิโรจน์ ไววานิชกิจ
จดหมายเหตุทางแพทย์ ฯ 2544; 84: 422–425

* ภาควิชาเวชศาสตร์ชันสูตร, คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพ ฯ 10330