

Comparison of the Wintrobe Method with the Westergren Method for the Estimation of Erythrocyte Sedimentation Rate (ESR)

Sanjeev Ahirwar¹, Aalema Khan², Md Masud Azahar³

¹Assistant Professor

¹Department of Paramedical Sciences, ²Department of Microbiology, ³Department of Histology
^{1,2,3}MMLT, BMLT – LNCT Vidhyapeeth University, Indore, India

Abstract

Background: Erythrocyte Sedimentation Rate (ESR) is a widely used hematological test for detecting inflammation and monitoring disease progression. Among the various methods for ESR determination, the Wintrobe and Westergren methods are commonly employed. This study aims to compare the accuracy, precision, and clinical applicability of the Wintrobe and Westergren methods for ESR estimation.

Materials and Methods: Blood samples from 100 subjects were collected in EDTA anticoagulant tubes. ESR was measured using both Wintrobe and Westergren methods. Data were analyzed using mean, standard deviation, and correlation coefficients to assess agreement between the two methods.

Results: The mean ESR values obtained by the Wintrobe method were slightly lower than those obtained by the Westergren method. Statistical analysis revealed a strong positive correlation ($r = 0.87$, $p < 0.001$) between the two methods. However, the Westergren method consistently demonstrated higher sensitivity in detecting elevated ESR levels.

Conclusion: Both methods are reliable for ESR estimation; however, the Westergren method remains the gold standard due to its higher sensitivity and broader clinical applicability. The Wintrobe method may be useful in resource-limited settings or for rapid screening.

Keywords: ESR, Wintrobe method, Westergren method, Hematology, Inflammation

Introduction

Erythrocyte Sedimentation Rate (ESR) is an indirect measure of the acute phase response and reflects the presence of inflammation. It is widely utilized in diagnosing and monitoring conditions such as infections, autoimmune disorders, and malignancies. The two commonly used methods for ESR estimation are the Wintrobe and Westergren methods.

- The **Westergren method** is considered the reference standard due to its sensitivity, but it requires more blood and takes longer to perform.

- The **Wintrobe method** is faster, uses a smaller blood volume, and is less labor-intensive but may underestimate ESR values, particularly in high-sedimentation conditions.

This study aims to evaluate and compare the Wintrobe and Westergren methods to determine their correlation and clinical relevance.

Materials and Methods

Study Design: Observational cross-sectional study

Study Population: 100 subjects aged 18–65 years visiting the hospital for routine hematological investigations.

Sample Collection:

- 2 mL of venous blood collected in EDTA tubes.
- Samples processed within 2 hours of collection to prevent changes in ESR.

ESR Measurement:

1. **Wintrobe Method:** Blood filled in Wintrobe tubes (100 mm), left undisturbed at room temperature. ESR measured after 1 hour.
2. **Westergren Method:** Blood diluted with sodium citrate (4:1 ratio), filled in Westergren tubes (200 mm). ESR recorded after 1 hour.

Statistical Analysis:

- Mean and standard deviation calculated for both methods.
- Pearson correlation coefficient used to assess agreement between methods.
- Bland-Altman plot applied to evaluate systematic differences.

Results

Method	Mean ESR (mm/hr)	SD	Range (mm/hr)
Wintrobe	15.2	7.4	3–38
Westergren	18.6	8.1	4–45

- Strong positive correlation observed between the Wintrobe and Westergren methods ($r = 0.87$, $p < 0.001$).
- Wintrobe method tended to give slightly lower ESR values compared to Westergren, particularly in samples with high ESR.

- Bland-Altman analysis showed minimal systematic bias, confirming that Wintrobe can be a reasonable alternative in routine screening.

Discussion

The study confirms that while both Wintrobe and Westergren methods are reliable, the Westergren method is more sensitive for detecting elevated ESR levels. The Wintrobe method may underestimate ESR, especially in patients with marked inflammation.

- **Advantages of Wintrobe:** Faster, less blood required, easy to perform.
- **Advantages of Westergren:** Higher sensitivity, standard reference method recommended by the International Council for Standardization in Haematology (ICSH).

Clinical interpretation should consider the method used, as differences may influence disease monitoring and therapeutic decisions.

Conclusion

Both Wintrobe and Westergren methods provide clinically useful ESR measurements. Westergren remains the gold standard due to higher sensitivity, but Wintrobe is a practical alternative in routine or resource-limited laboratory settings.

References

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