

**ESR (Erythrocyte Sedimentation Rate) measures how fast red blood cells settle in a tube in one hour. It is a nonspecific test for inflammation.**

**Normal Range:**

- Men: 0–15 mm/hour
- Women: 0–20 mm/hour • Children: 0–10 mm/hour

**Increased ESR:**

1. Infections (e.g., tuberculosis)
2. Inflammatory diseases (e.g., rheumatoid arthritis, lupus).
3. Cancers (e.g., multiple myeloma).
4. Pregnancy or anemia.

**Decreased ESR:**

- Polycythemia or sickle cell anemia.

**Clinical Use:**

1. Detects inflammation.
2. Monitors disease activity (e.g., arthritis).

While useful, ESR is nonspecific and often combined with other tests like CRP for better accuracy

. Several factors can affect the Erythrocyte Sedimentation Rate (ESR), influencing its accuracy and interpretation:

**1. Physiological Factors:**

- Age: ESR increases with age.
- Gender: Higher in females than males.
- Pregnancy: Elevated ESR due to increased fibrinogen levels.

**2. Hematological Factors:**

- **RBC Size and Shape:**
- Macrocytes settle faster (increased ESR).
- Abnormal shapes (e.g., in sickle cell anemia or spherocytosis) reduce ESR.
- **RBC Count:**

- Anemia: Fewer RBCs = higher ESR.
- Polycythemia: More RBCs = lower ESR.

### **3. Plasma Composition:**

- **Increased ESR:**
    - High fibrinogen levels (e.g., inflammation, pregnancy).
    - High globulins (e.g., multiple myeloma, infections).
  - **Decreased ESR:**
    - Hypofibrinogenemia.
    - Increased albumin (opposes rouleaux formation.)
- #### **4 .Pathological Conditions:**
- a) Infections: Elevate ESR due to inflammation.
  - b) Inflammatory Diseases: Rheumatoid arthritis, lupus.
  - c) Cancers: Especially multiple myeloma and lymphomas.
  - d) Severe Liver Disease: Can either increase or decrease ESR based on protein synthesis.

### **5. Medications:**

- **Increase ESR:** Oral contraceptives, steroids.
- **Decrease ESR:** NSAIDs, corticosteroids, aspirin.

### **6. Technical Factors:**

- **Sample Handling:** Delay in testing or tilted tubes may increase ESR.
- **Temperature:** High ambient temperature can raise ESR.

In summary, ESR is influenced by age, gender, RBC characteristics, plasma proteins, diseases, and technical factors, which should be considered when interpreting results.

### **HOW to do ESR?**

The Erythrocyte Sedimentation Rate (ESR) test measures how quickly red blood cells (RBCs) settle in a vertical tube of blood. There are two main methods for performing the test:

1. **Westergren Method (Standard Method):**
2. **Wintrobe Method:**

**1. Westergren Method (Standard Method):** This is the most commonly used and standardized method for ESR testing.

**Procedure:**

**1 .Sample Collection:**

- Collect venous blood into a tube containing an anticoagulant (commonly EDTA or sodium citrate.)

**2 .Dilution:**

- Mix 4 parts blood with 1 part sodium citrate (if not pre-anticoagulated.)

**3 .Tube Setup :**

Place the blood in a Westergren tube (a 30 cm long, 2.5 mm diameter glass tube marked in millimeters).

- Keep the tube vertical in an ESR stand.

**4 .Incubation:**

- Leave the tube undisturbed for 1 hour at room temperature.

**5 .Reading the Result:**

- Measure the distance (in mm) from the top of the blood column to the top of the settled RBC layer.

**2 .Wintrobe Method:**

This is an older method, less commonly used, and involves a shorter tube.