**ERYTHROCYTE SEDIMNTATION RATE (ESR)**

If an anticoagulant is added to the blood and the specimen allowed to stand in a tube, red cells slowly sediment to the bottom of the tube leaving clear plasma as the supernatant. The rate of sedimentation estimated under standard conditions is known as the erythrocyte sedimentation rate (ESR). Sedimentation takes place in three stages:-

(1) Formation of rouleaux; Rouleaux is formed with minimal sedimentation. This phase lasts about 10 minutes.

(2) Period of fast settling; at this stage the settling; rate is constant and lasts about 40 minutes.

(3) Final stage; the remaining amount of time is a period of packing of the rouleaux at the bottom of the tube.

**Methods of Estimation**

There have been two methods to perform an ESR

(1) Wintrobe method.

(2) Westergren method.

**Westergren method**

Westergren tube: Length -300 mm (open at both ends)

Diameter- 2.5 mm

**Procedure**

A- The lower 20 CMS (200 mm) are marked from O (top) to 200 (bottom).

B-Anticoagulant used is 3.8% trisodium citrate solution. 1 part of anticoagulant is added to 4 parts of blood (0.5 ml of anticoagulant is used for 2 ml blood).

C-The mixture is drawn into a Westergren tube up to the zero mark and the tube set upright in a stand with a spring clip on top and rubber at bottom.

D- The level of the top of the red cell column is read at the end of 1 hour.

Note-care should be taken to keep the tube vertical, an inclination of 3 degree raises ESR by almost 30 %.

**Normal range**

ESR = 0-8 mm/hour in male and 0-20 mm/hour in female.

**Clinical correlation:-**

Increase ESR:-

1- old age and pregnancy

2- Acute and chronic infections

3- Connective tissue disease like rheumatoid arthritis

4- Tumors

1. anemia

Decrease ESR in:-

1. polycythemia
2. sickle cell anemia