Erythrocyte Sedimentation Rate (ESR)

Is the distance (in millimeter) that erythrocyte fall per until of time usually 1 hour .The distance that the cells fall in 1 hour can be measured and is called the sedimentation rate .This sedimentation occurs in three stages:

1-Formation of rouleaux
2-Period of fast settling
3-Period of packing of the rouleaux at the bottom of the tube.

Rouleaux:
the stacking up of red blood cells ,caused by extra of abnormal protein in the blood that decrease the normal distance red cells maintain between each other.

Factors affecting ESR

1-size of RBCs: In vitamin B12 deficiency RBCs are large in size and the sedimentation rate increased ,while in iron deficiency RBCs are small in size and the sedimentation rate decreased.
2-number of RBCs: In anemia ESR increase ,while in Polycythemia ESR decreased
3-plasma proteins concentration: The more plasma protein present, the more rouleaux phenomena
4-Hemoglobin content.
5-blood viscosity.

Clinical Applications

ESR increased in:
1-Rheumatoid arthritis and Tuberculosis.
2-Multiple myeloma ,whine cancer of a certain type of while cells.
3-Acute infections.
4-Anemia.
5-Kidney disease.
6-Autoimmune and inflammatory disease.
7-Pregnancy.

ESR decreased in:
1-Sickle cell disease.
2- Polycythemia .
3-Congestive heart failure.
**Normal value:**
Children: 0-10 mm/hr
Women: 0-20 mm/hr
Men: 0-15 mm/hr

**Procedure**
1- Place 0.5 ml of 3.8% Trisodium Citrate in test tube.
2- Add 2 ml of blood sample to the test tube.
3- Mix the contents of test tube gently.
4- Fill the westergren tube to 0 mark.
5- Set up the westergren tube right in a stand with a spring clip on top and rubber at bottom.
6- Read the highest of the clear plasma above the upper limit of the column of sediment red cells in mm/hr.