www.jmscr.igmpublication.org
Impact Factor 5.84
Index Copernicus Value: 83.27
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v5i5.140

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Erythrocyte Sedimentation Rate, Measurement by Capillary Tube Method, (MICRO ESR)- Best Method for Neonate and Small Children

Authors
Dr B.C.Adhikari[1], Dr Satyabrata Patra[2], Dr Camellia Chanda[3], Dr R K Shrivastava[4]
[1]MBBS, MD (Path), Asso. Professor, Dept. of Pathology RIMS Ranchi
[2]MBBS, MD (Path) Tutor, Dept. of pathology, RIMS, Ranchi
[3]MBBS, PGDMCH, Tutor Dept. of anatomy RIMS, Ranchi
[4]MBBS, MD (Path), Professor, Dept. of pathology RIMS Ranchi

ABSTRACT
Westergren method is the reference method to measure Erythrocyte Sedimentation Rate (ESR) by the International Council for Standardization in Haematology. But for neonate and small children it is very tough to collect 1.6 ml blood in a syringe. Because the veins of neonates and small babies are very thin and most of the time blood stops comming out due to displacement of needle. Again it is very tough to mix this blood with 3.8% sodium citrate in a FIXED ratio of 1:4. In this method very small (approximate) amount of blood is taken in AK2EDTA tube. There is no need to mix the blood with sodium citrate The results obtained using capillary micro esr showed a good correlation with those obtained using the Westergren method. Supporting the hypothesis that capillary micro esroffersa fast and safe ESR determination with very little amount of blood, ensuring precision and a very good correlation with the reference method.
Keywords: *erythrocyte sedimentation rate; capillary micro esr; paediatric patient; Westergren method.*

Introduction

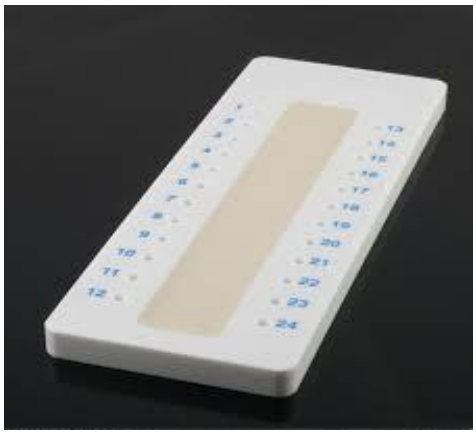
The erythrocyte sedimentation rate (ESR) is widely used as a screening test for patients with acute and chronic inflammatory diseases. Although it is nonspecific diagnostic test, but it is a marker for neonatal infection, it is used in monitoring and follow-up of certain groups of patients, such as those with rheumatoid arthritis, polymyalgia, rheumatic and Hodgkin's disease, where disease activity is mirrored by changes in the ESR. Recently, it was reported to be a prognostic value in the case of acute coronary syndrome and stroke and an independent predictor of mortality .The International Council Standardization in Haematology (ICSH) and the National Committee for Clinical Laboratory Standards selected the Westergren method, which makes use of undiluted blood sample with K2EDTA as anticoagulant (dilution less than 1%) as the reference technique for measuring ESR. The original ICSH reference method was based on the methodology of Westergren, which used diluted blood 4 volumes blood plus 1volume citrate. Modifications of these specifications particularly the use of undiluted blood, are now recommended as the basis of a new ICSH reference method. Because this method presents a lot of variables, such as specimen collection, time, temperature of specimen, storage etc. several new

techniques for measuring ESR have been developed and introduced in clinical laboratories

Materials and Methods

The study subjects were chosen randomly from the paediatric department. Both indoor and OPD patients were included. Two K2EDTA TUBES are taken for each patient. In FIRST K2EDTA tube, on an average 10 to 15 drops of blood is taken using a 22G needle without the syringe and is mixed well. And in SECOND K2EDTA tube 2ml blood is added using normal venepuncture technique. In both the techniques blood samples were collected in theK2EDTA and tested within one hour of venepuncture. The population consisted of 54 patient samples obtained at RIMS, RANCHI and analyzed . The test group was composed of 32 males and 22 females, THE blood of first tube after mixing was taken in capillary tube and allowed to stand vertically over a plasticin tray. Plasticine, a brand of modelling clay, is a putty-like modelling material made from calcium salts, petroleum jelly and aliphatic acids. The name is a registered trademark of Flair Leisure Products plc. Plasticine is used extensively for children's play, but also as a modelling medium for more formal or permanent structures. Because of its non-drying property, it is a popular choice of material. the capillary tube filled with anticoagulated blood is slightly pressed in the plasticin tray so that the capillary stands vertically of its own.

Capillary Glass Tubes



Plasticine Base Capillary holder

After one hour the height of the plasma and total height of the capillary is measured . The ratio of height of the plasma to the total height of the blood filled capillary is multiplied by 200. This is the result of capillary based micro ESR Using the second tube reference method was performed according to ICSH specifications on undiluted blood samples anticoagulated with K2EDTA using glass pipettes. Test tubes were gently and manually mixed for 20 times and pipettes were inserted into tubes until the column of blood rose to the start stopper. During sedimentation, the graduated pipettes were mounted vertically on appropriate supporting racks and kept at room temperature. After 1 hr, RBC sedimentation was recorded through visual determination.

Result

ESR was 18mm/hr (range: 2–42 mm/hr) for the reference method and 19mm/hr (range:3–47mm/hr) for MICRO ESR. There was a significant correlation between Westergren and MICRO ESR measurements. The same results were also obtained considering the Spearman's rank correlation coefficient.

Conclusion

Capillary tube based MICRO ESR, using small amount (average 10 to 15 drops) of K2EDTA blood is reliable, easy to perform, safe, cheap and patient complient method for ESR determination. Correlation of micro esr with westergrens method of ESR determination is very good. In one word it

is one of the best method for ESR measurement in paediatric age group specially the neonates and small children in whom letting 1.6 ml of blood is not an easy operation

References

1. Alfadhli SM, Al-Awadhi AM. Comparison of erythrocytese dimentation rate measurement by the automated SEDI system and conventional Westergren method using the Bland and Altman statistical method. Med Princ Pract 2005;14:241–244
2. Perovic E, Bakovic L, Valcic A. Evaluation of VES Matic Cube200—an automated system for the measurement of the Erythrocyte Sedimentation Rate. Int J Lab Hematol 2010;32:88–94
3. International Council for Standardization in Haematology (ICSH). ICSH recommendations for measurement of erythrocytese dimentation rate. J Clin Pathol 1993;46:198–203.
4. National Committee for Clinical Laboratory Standards (NCCLS).methods for the erythrocyte sedimentation rate (ESR) test. Wayne, NCCLS, 1993
5. Westergren A. The technique of the red cell sedimentation reaction. Am Rev Tuberc 1926;14:94–101.