Erythrocyte sedimentation rate in healthy first year medical students

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ABSTRACT

Objective: To determine the reference value of erythrocyte sedimentation rate (ESR) in young healthy individuals following the standardized criteria of the International Committee for Standardization in Hematology.

Method: The ESR was determined in a sample of 422 medical students of Karachi, Pakistan from the year 1998 to 2004. After considering exclusion criteria, the data of 311 students (132 males and 179 females) were analyzed.

Results: The reference values found in this study are 0-13 in the 1st hour for healthy young males and 0-40 mm in the 1st hour for healthy young female students.

Conclusion: We suggest that the reference values for ESR should be determined for various segments of the local population.

Despite the lack of sensitivity and specificity of the erythrocyte sedimentation rate (ESR) for screening or ruling out specific diseases, ESR remains the most commonly employed test to detect acute phase response.[1-3] The ESR is used to assist in the diagnosis and evaluation of the response to therapy in a wide range of diseases.[4] The International Committee for Standardization in Hematology (ICSH) does not recommend an international reference value for ESR, because it is influenced by many local factors.[5] Racial variations in ESR levels have also been reported.[6] Therefore, ESR normal values should be established for the population concerned. A range that includes 95% of values from a representative local healthy population should be established.[5] The reference range of ESR in the healthy population of Karachi is yet to be determined. The present study was carried out to determine the reference values of ESR in healthy young adults of Ziauddin Medical University, Karachi, Pakistan.

Methods. Students of Ziauddin Medical University, Karachi, Pakistan on their entrance in the first year were recruited for this study. This is a private medical university. Students mostly belong to the middle and upper socioeconomic strata of society. A total of 422 students were examined over 6 years from 1998-2004. To include "healthy young adults" inclusion criteria was (i) absence of the history of recent fever, (ii) absence of the history of recurrent fever in the past 6 months, (iii) absence of the history of arthritis, arthralgias, skin rashes, and cough (iv) blood pressure of 100-130 mm Hg systolic, and 60-90 mm Hg diastolic, (v) pulse rate of 60-100 beats per minute, (vi) respiratory rate 16-22 per minute, (vii) absence of lymph node and thyroid enlargement, (viii) absence of joint swellings or deformities, (ix) hemoglobin levels >13 gm % in males and >11.5 gm % in females, (x) pack cell volume from 40-52% for males and 35-47% for females, and (xi) normal lung fields and hila in a postero-anterior view chest x-ray (absence of infiltration, effusion, fibrosis, and hilar lymphadenopathy).

Measurement of ESR. The ESR was measured by the method of Westergren (1 hour) using sodium citrate anti-coagulant and performed within 2 hours of venipuncture at room temperature, as recommended by the ICSH.

Data were analyzed using Minitab, and results were presented as mean ± standard deviation separately for males and females. The 95th percentile

as well as the median and interquartile range (between the 25th and 75th percentiles) is also determined separately for males and females.

Results. A total of 422 students were examined (males = 151, females = 271). Of these, 19 males and 92 females were excluded because of hemoglobin values less than 13 gm % for males and 11.5 gm % for females. Another 7 females were excluded because of total leukocyte count greater than 11,000 per cc. The final ESR estimation was carried out on 132 males and 179 females. The mean ESR values for males were 5.4+3.9 mm/hr, for females was 14.2+11.3 mm/hr. The range and distribution of the ESR values are given in the **Figure 1**.
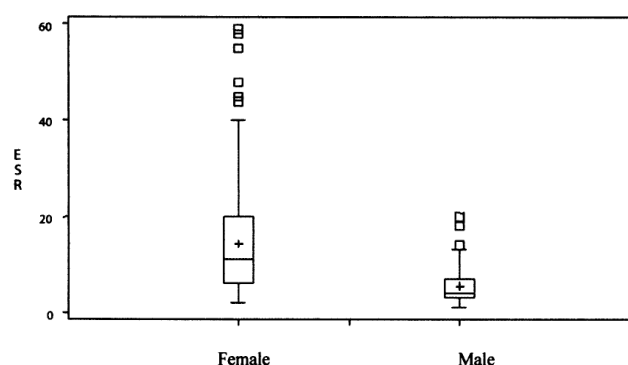
Figure 1 - Erythrocyte Sedimentation Rate (ESR) (mm in 1st hour) for female and male students.

Discussion. Quantitative measurements of acute phase proteins are a valuable indicator of presence, extent, and response of inflammation to treatment.[7] When short-term (less than 24 hour) changes in the inflammatory response are expected, quantitative assay of C-reactive protein is the test of choice.[8] The hyperproteinemia that develops in response to longer term (more than 24 hour) inflammatory response is complex and may vary from one disease to another. A test that is sensitive to the combined effect to several plasma proteins is therefore indicated, and appropriate tests include the ESR and plasma viscosity.[9-11] Tests for monitoring short-term and long term changes in acute phase proteins are complimentary and should be preferred according to different clinical purposes.[12]

The ESR is poor in quality control and lacks reproducibility, however, it remains the most widely used test in developing countries because it is less expensive, easy to perform and does not require electrical power and capital investment in equipment.[13] It will remain a widely used test in developing countries until better tests such as C-reactive proteins, zeta sedimentation ratio, and plasma viscosity become economically feasible.[5,14]

Factors that increase ESR include female gender,[15] age,[16,17] hyperfibrogenemia,[18] infections (infective endocarditis),[19,20] collagen vascular diseases (giant cell arteritis),[21,22] metastatic malignancies and decreased pack cell volume.[23]

No international reference range is recommended by the ICSH due to the influence by many local conditions on ESR. It should be established for the population concerned by using data from a representative local healthy population. The reference values that we found in this study are 0-13 mm in the 1st hour for healthy males, and 0-40 mm in the 1st hour for healthy females from 17-21 years of ages. These findings suggest that in the age group of 17-21 years, an ESR value >13 mm in the 1st hour in males and >40 mm in the 1st hour in girls should be considered abnormal.

Further large-scale studies in the local healthy population of different age groups are recommended to determine the normal reference values and to substantiate the results of this study. The reference value in this study would help to reduce confusion in the interpretation of ESR in the local population of the specified age group. However, the point on the continuum between normal and abnormal is on arbitrary decision. This is true for any test results that take on a range of values. Therefore, the cut off point for the presence or absence of acute phase response recommended here should be used with caution. Normal results do not always exclude physical disorders.

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