Causes of high erythrocyte sedimentation rates in an inpatient population

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To the Editor: We wished to determine the disease associations with erythrocyte sedimentation rates (ESRs) of ≥ 100 mm/h in an inpatient population at Kalafong Hospital, Pretoria.

All patients admitted to an adult ward from December 2001 to July 2002 with ESRs of ≥ 100 mm/h were included in the study, following patient consent. Diagnoses were divided into one of six groups: (*i*) infection; (*ii*) malignancy; (*iii*) inflammatory/connective tissue disease; (*iv*) renal disease; (*v*) miscellaneous diseases; and (*vi*) idiopathic causes. Available relevant biochemical and microbiological data were included to assist with diagnosis. We conclude that an ESR of ≥ 100 mm/h is not diagnostic of any one disease; however, it is highly associated with infection.

The ESR is a low-cost, nonspecific test. Traditionally it has been taught, without substantiating evidence, that very high ESR values (≥ 100 mm/h) are associated with tuberculosis (TB), Hodgkin's disease, multiple myeloma and chronic infective or inflammatory conditions.

Disease associations in patients with ESRs of ≥ 100 mm/h have recently been reviewed.[1] The most common associations with extreme elevations in the ESR were found to be infection (39.0%), malignancy (23.0%), inflammatory/collagen disease (22.1%), miscellaneous diseases (12.6%), renal disease (6.0%) and idiopathic causes (2.4%).[1] There are presently no studies examining extreme ESR elevation in a South African population, which has a high prevalence of HIV/AIDS.

Materials and methods

This study was a prospective observational trial with the aim of ascertaining the associated disease(s) in an adult inpatient population at Kalafong Hospital with ESR values of ≥ 100 mm/h. The ethical committee (Faculty of Health Sciences research, University of Pretoria) approved the project.

Inclusion criteria were admission to an adult ward and an ESR of ≥ 100 mm/h. ESRs were measured at Kalafong laboratory using a Sedimatic 100, which employs the Westergren method. After values were obtained patients were approached to participate in the study. Patient selection, diagnosis, work-up, special investigations and ESR determination were left to the discretion of the admitting doctors, none of whom was aware of the study. A total of 419 inpatients seen from December 2001 to 15 July 2002 were found to have ESRs of ≥ 100 mm/h. Demographic data, diagnosis, and special investigations were entered into the computer and statistical analysis was performed using Statistics 5.0.

Results

A total of 419 inpatients were found to have ESR values of ≥ 100 mm/h. There are more observations per category than the total number of patients as most patients had more than 1 diagnosis. Only 72 patients (17.18%) had a single known diagnosis. The most common disease association was infection (384/419, 91.65%) followed by miscellaneous diseases (4.9%), malignancy (3.8%), renal disease (3.1%), inflammatory disease (2.9%) and idiopathic causes (0.2%) (Fig. 1).

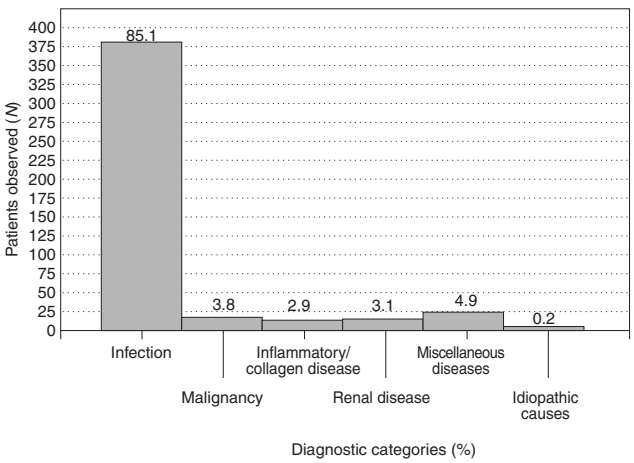

Fig. 1. Percentage distribution of disease groups associated with ESRs of ≥ 100 mm/h.

The most common infections were pneumonia (70.67%), gastroenteritis (6.77%), meningitis (6.27%), urinary tract infections (5.26%), orthopaedic sepsis (3.76%), obstetric and gynaecological infections (1.50%) and general sepsis (0.50%). Other infections (2.76%) included hepatitis, encephalitis, malaria, pericarditis, infective endocarditis and rickettsial infections. An aetiology for the pneumonia was found in 51.41% of cases, with bacterial pneumonia other than mycobacterial representing the largest portion (181 patients, 64.18%). The most common single infective organism was

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Mycobacterium tuberculosis (36.88%).

The 17 malignancies included multiple myelomas (5), prostate cancers (3), breast cancers (2), Kaposi's cancers (2), oesophageal cancer (1), colon cancer (1), lung cancer (1), Hodgkin's lymphoma (1), and acute myeloid leukaemia (1). The 13 most common diagnoses in the inflammatory/collagen vascular diseases included 2 cases each of systemic lupus erythematosus, discoid lupus erythematosus, rheumatoid arthritis, and psoriasis. There were 14 patients with renal diseases: 9 chronic renal failure, 2 acute renal failure, 1 haemolytic uraemic syndrome, 1 glomerulonephritis, and 1 nephritic syndrome. Fifteen miscellaneous associations were found including 5 cerebrovascular incidents, 4 heart failures, 2 myocardial infarctions, 2 deep venous thrombosis of the leg, 1 peripheral neuropathy, and 1 rhabdomyolysis. Of the 59 patients in these groups 25 (42.37%) had a co-morbid disease, mostly infection, which probably contributed to elevated ESR values.

The only patient classified idiopathic was a 72-year-old woman with a right femoral neck fracture, apart from which her clinical examination, chest X-ray and biochemistry were normal.

Of the total number of patients tested, 266 (63.28%) tested positive and 30 (7.16%) negative for HIV, and 123 (29.36%) were not tested. Of those tested 89.86% were HIV-positive. An absolute lymphocyte count below normal (1 000 x 10^6) was found to be associated with a CD4 cell count lower than 200/µl in 95.3% of patients (103/108), while 74.7% (86/115) were found to have CD4 counts lower than 200/µl with normal lymphocyte counts.

Discussion

Previous reports in which a maximum of 60% of patients (average of 39%) presented with infection are in stark contrast with our finding of 91.65%.[1] The number of patients with PTB was substantially higher than in any other previously reported ESR study, probably because of the high rate of HIV infection in our population.

The high prevalence of HIV in our study is problematic as HIV patients have elevated ESR values irrespective of the presence or absence of clinical disease.[2] Correlations, from strongest to weakest, between ESR and plasma constituents are increased fibrinogen, alphaglobulins, gammaglobulins, reduced albumin levels, and high cholesterol levels.[3,4] Stomatocytosis and anaemia also falsely increase ESR levels.[5,6] Most of these variables were present in our population: anaemia (89.83%), increased globulin fraction (100.00%), and low albumin levels (97.59%). Anaemia, increased fibrinogen and gammaglobulins, as well as low albumin are a common finding in HIV-infected patients.[7,8] This probably explains a large portion of patients with such marked ESR elevations, as 89.86% of patients tested in this study were HIV-positive.

The study limitations include patient selection. The findings of our study were probably skewed as not all admitted patients had an ESR test performed, and not all patients with ESRs of ≥ 100 mm/h were admitted. The findings of our study are largely relevant to patients admitted to medical wards since these comprised 86.6% of our study group. However, our findings are more likely to represent the average patient being investigated at Kalafong Hospital since doctors were unaware of the study. The patient's diagnosis is influenced by doctor variability and work-up and there would also be patients with faulty and/or missed diagnoses.

In summary, this prospective observational study of disease associations with ESRs of ≥ 100 mm/h demonstrated a high correlation with infection, specifically pneumonia.

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