Research Article

RELATION BETWEEN HAEMOGLOBIN CONCENTRATION AND ERYTHROCYTE SEDIMENTATION RATE IN TERTIARY CARE SETUP

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ABSTRACT

The erythrocyte sedimentation rate (ESR) is the rate at which erythrocyte settles in a vertical column of anticoagulated blood in 60 minutes. It is a simple and inexpensive laboratory test that is frequently requested for, in clinical medicine. The ESR is a relatively non-specific test that is frequently requested for during the diagnosis and monitoring of disease. Although most clinicians know that anaemia is associated with a raised ESR, few take into account normal haemoglobin values when interpreting an ESR result. A total of 1000 cases were included. The Hb and ESR results were analyzed by using SSPS (version 20), $p < 0.01$ considered as significant level. Cases were categorized on the basis of hb level. The ESR should therefore be interpreted with due regard to the Hb. Category 1 (<6gm /dl) and category 5 (>16 gm/dl) showed inverse relationship between Hb and ESR. Patients under category 2,3 & 4 showed minor variations where probably the underlying cause was infection, age, pregnancy, smoking etc. Our study has demonstrated excellent correlation between haemoglobin and ESR which is comparable with all available literature.

INTRODUCTION

The erythrocyte sedimentation rate (ESR) remains the most widely used laboratory test for monitoring the course of infections, inflammatory diseases, and some types of cancer. Several test methods have been developed recently, and as a result the safety and reliability of ESR testing procedures have improved.[1]

Despite its importance in many clinical conditions, ESR should be used only as a clinical guide to aid the diagnosis, management, and follow-up of these different clinical situations. The ESR can also have an important prognostic role in non inflammatory conditions such as prostate cancer, stroke, and coronary artery disease.[2]

This study was carried out to compare the relationship between ESR and haemoglobin (Hb) in anaemic and non-anaemic patients.
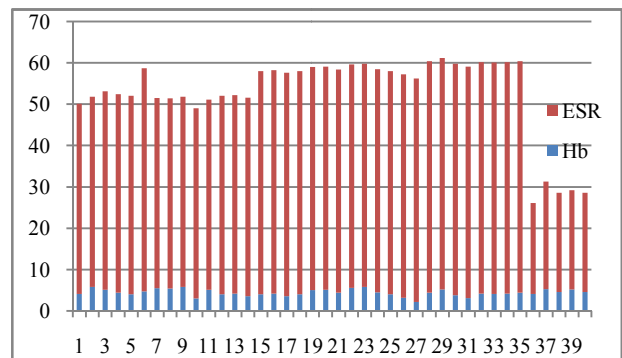
MATERIAL AND METHODS

All requests for blood count and ESR received from patients in the department of pathology of SGT university, Gurugram during a period of one month were investigated. Total of 1000 patients were included. Haemoglobin concentration (Hb)

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was measured with a six part automated analyser (sysmex 500XN) and ESR was estimated by a modified Westergren method. The Hb and ESR results were analyzed by using SSPS (version 20), $p < 0.01$ considered as significant level. Cases were categorized on the basis of hb level. Patient age and diagnosis (or reason for request) were not included in the analysis since one or the other of these was commonly missing from the sample request form.

Table 1 Category 1 (Hb - <6gm/dl)

Category	Hb(gm/dl)
1	< 6
2	6 to 9
3	9 to 12
4	12 to16
5	>16

RESULTS

A total of 1000 cases were included. The data was analysed and tabulated.
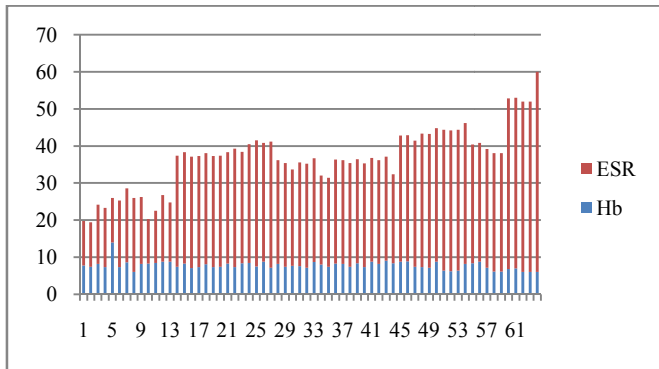

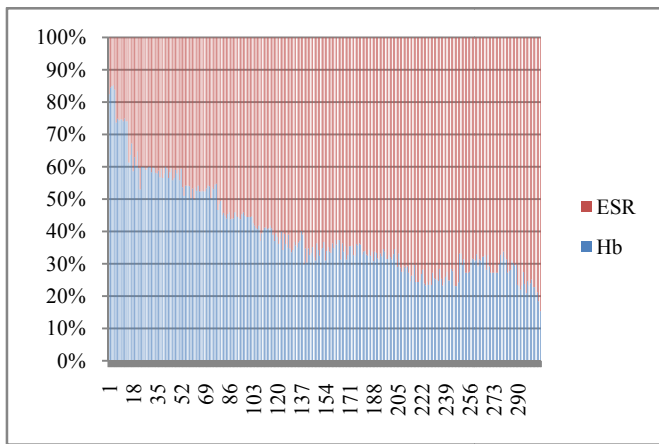**Table 2** Category 2 (Hb 6 to 9 gm/dl)

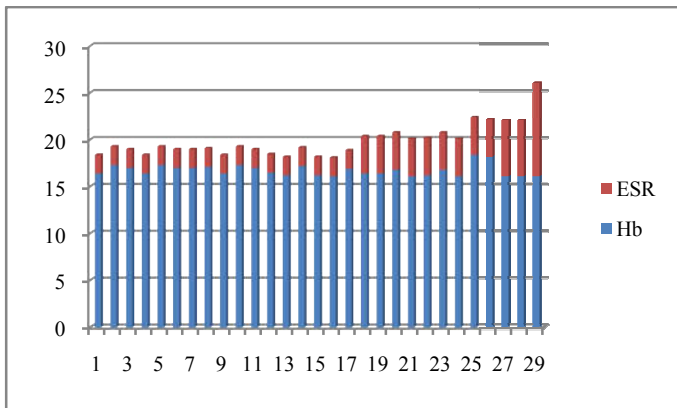**Table 3** Category 3 (Hb 9 to 12 gm/dl)

Table 4 (Hb >16gm/dl)

DISCUSSION

ESR was first noticed and recorded by Edmund Biernacki, a Polish physcian in 1897. It was modified and popularized by Fahraeus, Westergren, Wintrobe and others. Hence the method came to be known as Fahraeus-Westergren Method and later on simply as Westergren Method. In 1993, the International Council for Standardization in Hematology (ICSH) adopted Westergren Method as the reference method for ESR measurement. In 2011, ICSH and Clinical and Laboratory Standards Institute (CLSI) confirmed the Westergren Method as gold standard method for ESR evaluation.[5,6] The basic Principle of ESR is that RBCs normally settle quite slowly when anti coagulated blood is placed in a vertical column. This occurs due to repulsion of RBCs from each other by virtue of negative charge present on their surface (Zeta potential) and large surface area to volume ratio.[3,5] The flat surface of the discoid RBC gives them a large surface area to may contact with and stick to each other; thus forming a rouleaux. They occur when plasma protein concentration is high, and because of them the ESR is also increased. This is a non- specific indicator of presence of disease.[8]

Anaemia increases the ESR because the change in the erythrocyte plasma ratio also favour rouleaux formation, independently of changes in the concentration of the plasma proteins. By any method of measurement, the ESR is most sensitive to altered plasma proteins in the hamatocrit range of 0.30-0.40.[8]

The finding of a raised ESR in an individual patient may prompt detailed investigation or (in the case of disease monitoring) therapeutic intervention. If wrongly interpreted, the investigation may therefore generate unnecessary patient anxiety, discomfort and expense. A spurious increase of ESR in anaemic patients is well recognized.[3,6] While an inverse correlation between Hb (in the normal range) and ESR has been documented in normal individuals.[5,6]

The ESR should therefore be interpreted with due regard to the Hb. Category 1 (<6gm /dl) and category 5 (>16 gm/dl) showed inverse relationship between Hb and ESR. Patients under category 2,3 & 4 showed minor variations where probably the underlying cause was infection, age, pregnancy, smoking etc. Our study has demonstrated excellent correlation between haemoglobin and ESR which is comparable with all available literature.[9]

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