



ORIGINAL ARTICLE

Study of Diseases Associated ESR above 100 among the Patients who Visited Shahid Sadoughi Hospital in the Second half of 2013

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ABSTRACT

Introduction: ESR (Erythrocyte Sedimentation Rate) is the sedimentation rate of red blood cells per unit of time that is expressed in millimeters. ESR test is simple and inexpensive and fast and can be somewhat diagnostic manual to confirm the diagnosis, rule out the diagnosis, follow-up course of the disease and so on, so it is of interest to practitioners. **Methods:** Descriptive and cross-sectional study on 124 patients in all wards of Shahid Sadooghi hospital in the second 6 months of 1393, that had raised ESR of 100 at least one time. All information including gender, age, diagnosis of the presence or absence of fever and indigenous of them cases in the archive hospital patients were taken. **Results:** 56% female and 44% were male. 16% of patients in the age range 0-19 years, 56% aged 20-64 years and 28% were aged over 64 years. 41% of patients were admitted with fever. 59% were native and 41 % were non-native. Infectious causes (45.9%), malignancy (14.5%), collagen vascular disease (16.9%), internal disease and hematology (16.9%) and other causes (5.6%) were formed cases. Diabetic foot (7%), pneumonia (7%), RA (6%), ESRD (5.6%), metastatic lung cancer (4%), TB (3%) formed the majority of cases. In feverish cases pneumonia (11.5%), diabetic foot (7.6%), tuberculosis (5.7%), pyelonephritis (5.7%) and RA (5.7%) were the most frequent form. Infectious causes of fever (65.3%), collagen vascular (13.4%), malignancies (5.7%) and other causes (15.6%). **Conclusion:** In patients with extremely high sediment in terms of gender segregation is almost the same of hospital community.

INTRODUCTION

The erythrocyte sedimentation rate (ESR) is the rate at which red blood cells sediment in a period of time that can be expressed in terms of millimeters (1-3). In general, ESR is measured using a calibrated tube with standard diameter, which is filled out with completely anticoagulated blood sample. In this method, the rate of erythrocyte sedimentation is measured in a certain period (usually within one hour) (1).

In the beginning of the new era, Robin Fahraeus studied blood suspension stability and relevant changes in different diseases. He reviewed the history of ESR in 1921 and 1929 in detail (2,4). He identified physical and clinical factors that affect this rate. Fahraeus (1918) found out that the rate of red blood cell sedimentation is quicker in pregnant women compared to those who are not pregnant. His colleague, Westergren, invented the current ESR method in 1926. Since then, ESR has been the most common diagnostic test for determining inflammatory processes and the severity of these processes (2).

ESR is a simple, inexpensive, rapid as well as a relatively diagnostic test. Therefore, practitioners have paid attention to this test. Presence of certain diseases should be determined in case of elevated ESR. If the patient was diagnosed with a common disease, it may be possible to develop or improve the diseases by controlling ESR. Occasionally, serial changes in erythrocyte sedimentation rate determine response to treatment. In general, elevated erythrocyte sedimentation rate is not a specific finding but can indicate tissue damage, inflammation and lymphoproliferative disorder (5).

METHOD

First, the list of patients with ESR \geq 100 who visited Shahid Sadoughi Hospital from the beginning of April to the end of March was collected. Second, the record of patients was reviewed using the hospital's filing system to collect the required information.

Sample Size

In this study, 152 patients with at least one $ESR \geq 100$ during hospitalization were selected among which 38 patients were not eligible for the study due to following problems: absence of patient name in HIS, failure to register case number and consequently missing patient records, incomplete patient records, etc.). The remaining 124 cases were recorded. Their cases were fully investigated in order to get the necessary information. Following variables were studied: age, gender, final diagnosis of disease, native or non-native patient, presence or absence of fever during hospitalization and final diagnosis of patients with fever. In addition, the patients' case number and telephone number were recorded for additional information.

RESULTS

In this study, out of 300 clinical students, who were in their last semester, 325 participated in the research (respondents percentage was 92.3%). Table 1 represents the frequency of students participating in the research by their field of study. The mean (\pm standard deviation) of the participants' age was

24.60 \pm 3.64, with minimum and maximum age of 20 and 37 years, respectively.

According to Table 2, the majority of participated students were female (54.3%), and less than half of them (22.7%) had participated in isolation precautions courses and workshops. In addition, the majority of them (58.7%) called for holding training courses on infection control and isolation precautions guidelines (Table 2).

Data analysis indicated a significant statistical different between the students of different fields in terms of gender,

Table 1. The incidence of various diseases in patients with $ESR \geq 100$

Final diagnosis	Percent
Diabetic foot ulcers	7
Pneumonia	7
RA	6
SLE	6
ESRD	5/6
Metastatic lung cancer	4
Tuberculosis	4
Bed sore	2/4
Uncontrolled diabetes	2/4
Meningitis	2/4
Pyelonephritis	2/4
Undiff SPA	2/4
Lung abscess	2/4
Kawasaki	1/6
Empyema	1/6
Osteomyelitis	1/6
Abdominal abscess after hysterectomy	1/6
TTP	1/6
Pancreatic cancer	1/6
Caesarean section surgical site infection	1/6
Lymphoma	1/6
3VD	0/8
FUO	0/8
Typhoid	0/8
Rectal perforation	0/8

(Contd...)

Table 1. Continued

Final diagnosis	Percent
Ovarian abscess	0/8
Autoimmune hemolytic anemia+splenomegaly	0/8
Brain abscess+Splenic abscess+ESRD	0/8
Necrotizing fasciitis	0/8
Chronic cholecystitis	0/8
Fanconi anemia	0/8
Sepsis	0/8
Lymphadenitis	0/8
CBD stones	0/8
Preterm labor	0/8
Metastatic Cancer	0/8
FSGS	0/8
Bed sore+UTI	0/8
RPGN	0/8
PSC+UC	0/8
MPGN	0/8
MM	0/8
Rf+DKA	0/8
ADEM	0/8
MDS	0/8
AML	0/8
Cholangitis	0/8
Obstructive bladder cancer	0/8
Neck abscess	0/8
Pelvic abscess	0/8
Umbilical catheter-related infection	0/8
Recurrent arthritis	0/8
Pancreatitis	0/8
Colon cancer	0/8
Septic arthritis	0/8
Sinus mucormycosis	0/8
CMV infection	0/8
Prostate Cancer+Cellulite	0/8
Bronchiectasis	0/8
Ludwig's angina	0/8
Total	100%

(Contd...)

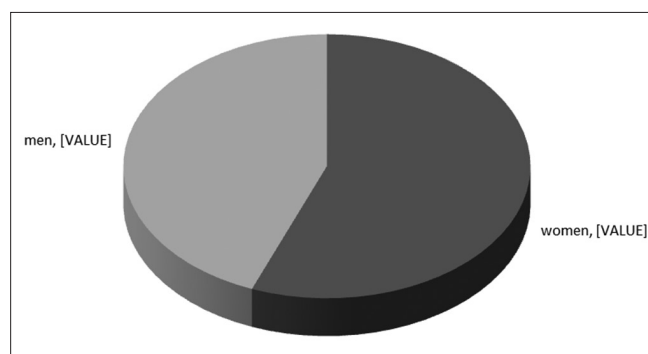


Chart 1: Frequency distribution of 124 patients with ESR \geq 100 by gender.

previous training in infection control, and the need for training in isolation precautions.

Data analysis also indicated a significant statistical difference between students' awareness about each area and also their general knowledge of isolation precautions (Table 3).

In this study, 70 patients were females (56%) and 54 patients were males (44%) among 124 studied patients with ESR \geq 100 (Chart 1).

According to aforementioned concepts and definitions of study variables, statistical description of the participants is as follows.

The age of the participants ranged from 18 days old infants to 91 years old elderly. According to this classification, most of the patients were between 20 and 64 years old. Among 124 patients, 20 patients (16%) were between 0 and 19 years old, 70 patients (56%) were between 20 and 64 years old and 34 patients (28%) were above 64 years old (Chart 2). In addition, 52 patients (41%) had at least one fever incident during the hospitalization period (temperature $\geq 37.8^{\circ}\text{C}$). Furthermore, the remaining 72 patients (59%) had no record of fever during hospitalization (Chart 3). Moreover, 72 patients (59%) were native (who lived in Yazd Province) and 52 patients (41%) were not native (Chart 4).

DISCUSSION

Ayati, Davoodi and Dehghan examined 100 patients with ESR \geq 100 hospitalized in Afshar, Shahid Rahnemoon and Rahahan hospitals in Yazd in 1997-1998. In the former study, 55% of the patients were males and 45% were females. Most of the patients were between 61 and 75 years old. High frequency diseases were respectively as follows: 44% of internal diseases, 39% of infection, 13% for surgery and trauma, 10% for malignancy and 6% of undiagnosed cases (6,7). In the present study, female patients were more than male patients compared to the former study (56% females vs. 44% males).

In the present study, causes of elevated ESR were respectively as follows: malignancies (14.5%), infections (45.9%), collagen and vascular diseases (16.9%), internal and hematologic disorders (16.9%) and other causes (5.6%). Internal causes has dramatically decreased compared to aforementioned study, which was performed 17 years ago. However, malignancies and infections have increased in the present

Table 2. Percentage of prevalence of different diseases in feverish patients with ESR \geq 100

Final diagnosis	Percent
Pneumonia	11/5
Diabetic foot ulcers	7/6
Tuberculosis	5/7
Pyelonephritis	5/7
Rheumatoid Arthritis	5/7
ESRD	3/8
Lung abscess	3/8
Caesarean section surgical site infection	3/8
Bed Sore	3/8
Kawasaki	3/8
FUO	1/9
Typhoid	1/9
Necrotizing fasciitis	1/9
Renal abscess	1/9
Sepsis	1/9
TTP	1/9
Pancreatic cancer	1/9
Meningitis	1/9
Metastatic lung cancer	1/9
Undiff SPA	1/9
ESRD+brain abscess+splenic abscess	1/9
PSC+UC	1/9
Neck abscess	1/9
SLE	1/9
AML	1/9
Septic arthritis	1/9
Sinus mucormycosis	1/9
Osteomyelitis	1/9
Diabetes mellitus type 1	1/9
Empyema	1/9
ADEM	1/9
Ludwig's angina	1/9
Prostate cancer+cellulite	1/9
Total	100%

study. In addition, trauma and surgery were addressed as other causes due to the low number of cases.

Akhondi and Ghasemi Nasab examined 144 patients diagnosed with malignancies and hospitalized in Shahid Rahnemoon and Afshar hospitals in Yazd in 1997. In the former study, 4.2% of the cases had ESR above 100. Furthermore, 42% of the patients were feverish while 58% of the patients were not feverish (8).

In the present study, 18 patients (14.5%) were malignant cases among 124 studied patients. Moreover, 3 cases (5.7%) were diagnosed with malignancy among 52 feverish patients. This shows a weak correlation of malignancy with fever compared to other diseases.

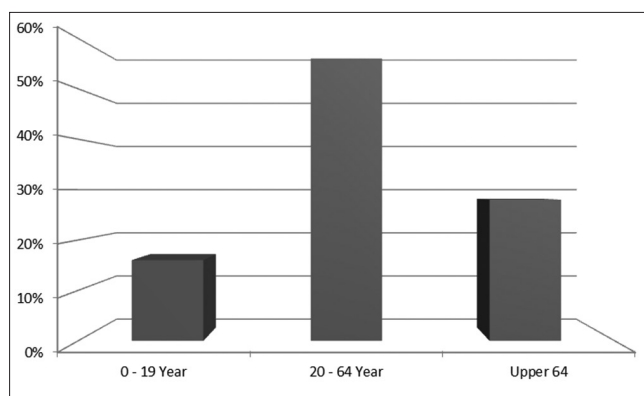


Chart 2: Frequency distribution of 124 patients with ESR \geq 100 by age.

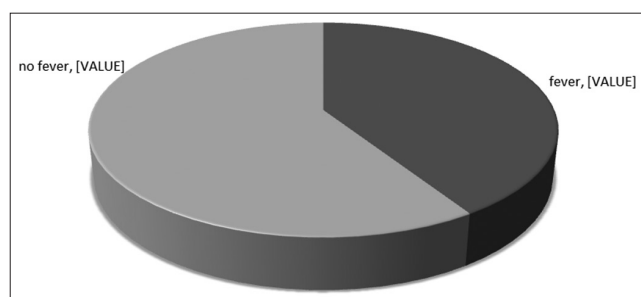


Chart 3: Frequency distribution of 124 patients with ESR \geq 100 of fever incident.

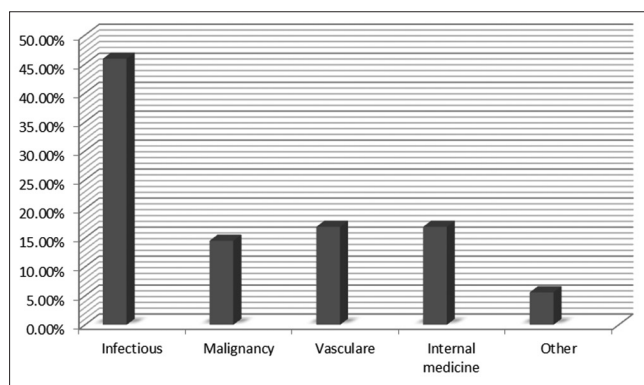


Chart 4: Frequency distribution of 124 patients with ESR \geq 100 in terms of final diagnosis.

Cankurtaran assessed elevated ESR in elderly. They studied 139 patients who were between 16 and 89 years old in Turkey in 2010. Among these patients, 72 patients (51.7%) were elderly. In addition, 55 patients were males and 84 patients were females (7-9).

Causes of elevated ESR were respectively as follows: malignancy was the leading cause (21.6%) (most cases were lymphoma (7 cases), followed by infectious disorders (10.1%), collagen vascular diseases (9.4%), and non-neoplastic hematologic disorders (5.0%). In 59 patients (42.4%), no specific pathology could be found. There were no statistically significant differences between elderly and non-elderly patients. ESR varied from 21 to 148. The patients were classified into three categories in terms of ESR: under 50 (15.1%), between 50 and 100 (45.3%) and more

than 100 (39.5%). Causes of ESR $<$ 50 were respectively malignancy (26.7%), hematology (6.7%), infection (3.3 %), other causes (6.7%) and undiagnosed (57.7%).

Causes of 50 $<$ ESR $<$ 100 were respectively as follows: malignancies (17.9%), infection (10.4%), collagen vascular diseases (11.9), hematologic disorders (4.5%), other causes (7.5%) and undiagnosed (47.8%).

Causes of ESR $>$ 100 were respectively as follows: malignancies (23.8%), infection (14.3%), collagen and vascular diseases (11.9%), hematologic disorders (4.8%), other causes (31.4%) and undiagnosed (23.8%). In the present study, causes of elevated ESR among 64 years old patients were respectively as follows: infection (46.3%), malignancies (35.7%), internal causes (11%) and collagen and vascular diseases (7%). These findings suggest a significantly higher frequency of infectious causes for elevated ESR in the present study compared to the aforementioned study in Turkey (10).

Parikh et al. (2005) studied prevalence of a normal C-reactive protein with an elevated erythrocyte sedimentation rate in biopsy-proven giant cell arteritis at John Hopkins Hospital in Baltimore. They studied 119 patients among which 87 patients (73.1%) were females. Mean age of studied patients was 75.8. The patients were between 52 and 97 years old. In addition, 99 patients (83.2%) had elevated ESR and CRP (11-13).

Moreover, 88 patients had elevated ESR regarding both formulas (Hayreh et al. And Miller). The remaining 11 patients had elevated ESR based on Hayreh's formula (not Miller's formula). Moreover, 17 patients (14.3%) had a normal ESR and high CRP based on the two formulas. Only 1 of the 119 patients (0.8%) was presented with a normal ESR and normal CRP according to the two formulas. Furthermore, 91 of 119 patients had a high ESR based on both formulas with a sensitivity of 76.5%. However, 102 patients had a high ESR based on Hayreh's formula with a sensitivity of 85.7%. In addition, 116 patients had high CRP with a sensitivity of 97.5%. The sensitivity of the ESR and CRP together was 99%. No significant difference was observed between the sensitivities of ESR and CRP in the disease (11).

CONCLUSION

In general, the results of this study suggested the following issues. Patients with extremely high sodium were quite similar to those hospitalized patients in terms of gender in the present study. It shows that sexual preference is not applied to this area. Most patients with ESR $>$ 100 were young and middle-aged (20-64) individuals. No significant difference was observed between the patients visiting Shahid Sadoughi Hospital in Yazd in terms of being native. 41% of studied patients had at least one fever incident in the course of the study. Thus, elevated ESR even above 100 is not always associated with fever. Certainly, absence of fever should not mislead a practitioner to assess ESR.

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AUTHOR'S CONTRIBUTIONS

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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