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STUDY OF ERYTHROCYTE SEDIMENTATION RATE (ESR) IN DIFFERENT PATIENT GROUPS AT JHALAWAR MEDICAL COLLEGE AND HOSPITAL

Pathology

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ABSTRACT

Background: Erythrocyte Sedimentation Rate (ESR) is a widely used, inexpensive, non-specific laboratory test for detecting and monitoring inflammation. Despite the availability of more specific markers, ESR remains a valuable diagnostic tool due to its simplicity, rapidity, and cost-effectiveness. This study investigates ESR values across various diagnostic categories in a tertiary care hospital setting. **Aim:** To study the variation in ESR values among different patient groups attending Jhalawar Medical College and Hospital. **Methods:** A prospective observational study was conducted over one year with 200 patients. ESR measurements were performed using the Westergren method. Patients were categorized according to diagnosis and demographic parameters. Statistical analyses included comparison of ESR values across groups and correlation with age and sex. **Results:** The study included 94 males (47%) and 106 females (53%) with a mean age of 35.41±15.03 years. Infectious diseases accounted for the highest proportion of cases (32.5%), followed by hematological diseases (19%) and inflammatory diseases (18.5%). Malignancies had the highest mean ESR values (91.73±21.15 mm/hr). Significant differences in ESR were observed between sexes and across specific diagnostic groups. Positive correlations of ESR with age were found in both sexes.**Conclusion:** ESR remains a valuable marker in the diagnosis and monitoring of a variety of diseases, showing significant variation with diagnosis, age, and sex. Its enduring utility in resource-limited settings underscores the need for continued use alongside newer diagnostic modalities.

KEYWORDS

Erythrocyte Sedimentation Rate (ESR), Inflammation, Diagnostic Groups, Westergren Method

INTRODUCTION

Inflammation is a physiological response to injury or infection characterized by a complex cascade involving the immune system.[1]

ESR reflects this process by measuring the rate at which erythrocytes settle in anticoagulated blood, influenced by plasma proteins such as fibrinogen and immunoglobulins that facilitate rouleaux formation.[2]

Although ESR is a non-specific indicator, it is extensively used as an initial screening and monitoring tool for inflammatory, infectious, neoplastic, and autoimmune diseases.[3]

The Westergren method is the global standard for ESR measurement, providing reproducible results across laboratories.[4]

This study aims to evaluate ESR variation concerning different clinical diagnoses in patients at Jhalawar Medical College and to analyze correlations with demographic variables.

MATERIALS AND METHODS

STUDY DESIGN:

Prospective observational study over 12 months.

Participants:

200 patients of varying age groups and diagnoses presenting at the hospital.

ESR MEASUREMENT:

Performed by the Westergren method following ICSH guidelines. Blood was collected in EDTA tubes, mixed thoroughly and measured for the sedimentation rate in mm/hr over one hour.

DATA COLLECTION:

Patients were categorized by diagnosis: infectious, inflammatory, autoimmune, hematological, cardiac, gastroenterology/hepatology, renal diseases, malignancies, and others.

STATISTICALANALYSIS:

Descriptive statistics, comparison of means using p-values for significance, and Pearson correlation coefficients for age-ESR associations were computed using SPSS.

RESULTS

Table 1: Demographic Distribution of Study Participants

Characteristic	Category	Number of Cases	Percentage (%)	Mean Age (years) ± SD
Gender	Male	94	47	36.19 ± 15.07
	Female	106	53	34.46 ± 14.06
Age Group (years)	0-10	14	7	7.5 ± 1.78
	11-20	17	8.5	14.29 ± 2.59
	21-30	39	19.5	26.84 ± 9.38
	31-40	70	35	35.82 ± 10.98
	41-50	28	14	45.00 ± 8.57
	51-60	20	10	54.85 ± 9.78
	>60	12	6	67.00 ± 9.78

Table 2: Diagnostic Group Distribution and Mean ESR Values

Diagnostic Group	Number of Cases	Percentage (%)	Mean ESR ± SD (mm/hr)	Male ESR ± SD (mm/hr)	Female ESR ± SD (mm/hr)
Infectious Disease	65	32.5	83.63 ± 23.95	73.64 ± 21.21	77.07 ± 21.22
Inflammatory Disease	37	18.5	67.60 ± 25.11	64.85 ± 21.95	82.08 ± 20.91
Autoimmune Disease	17	8.5	84.94 ± 25.33	N/A	84.75 ± 21.75
Hematological Disease	38	19	73.77 ± 24.68	55.52 ± 20.61	62.27 ± 21.73
Cardiac Disease	7	3.5	74.37 ± 25.51	79.25 ± 21.79	74.66 ± 22.43
Gastroenterology & Hepatology	14	7	73.76 ± 25.51	66.75 ± 21.52	75.20 ± 19.99
Renal Disease	16	8	75.22 ± 25.25	66.45 ± 20.58	66.66 ± 17.02
Malignancy	15	7.5	91.73 ± 21.15	92.25 ± 21.15	89.66 ± 5.50

Table 3: ESR Mean Values by Age Group and Gender

Age Group (years)	Total Mean ESR ± SD (mm/hr)	Male Mean ESR ± SD (mm/hr)	Female Mean ESR ± SD (mm/hr)	p-value (Male vs Female)

0-10	77.21 ± 21.83	66.10 ± 21.85	78.54 ± 23.66	0.002
11-20	75.76 ± 14.77	70.23 ± 14.35	80.40 ± 14.77	0.215
21-30	64.46 ± 19.12	70.85 ± 20.31	64.46 ± 19.12	0.241
31-40	76.65 ± 21.68	73.11 ± 20.27	76.65 ± 21.68	0.285
41-50	74.84 ± 22.32	86.67 ± 22.44	81.35 ± 22.32	0.140
51-60	86.71 ± 22.03	82.50 ± 22.03	78.82 ± 21.93	0.474
>60	88.75 ± 19.75	85.00 ± 19.85	88.28 ± 19.91	0.016

Correlation of ESR with Age

- Males: Pearson correlation r = 0.244, p = 0.0001 (positive correlation).
- Females: Pearson correlation r = 0.164, p = 0.0001 (positive correlation).
- Combined: Pearson correlation r = 0.204, p = 0.0001.

DISCUSSION

This study focused on understanding ESR ranges across diverse patient groups and the influence of demographic factors at a tertiary care hospital in Rajasthan. The slight female predominance aligns with regional demographic patterns possibly influenced by nutritional and health-seeking behavior differences. The dominance of infectious diseases among diagnostic categories reflects current epidemiological trends in India and the importance of ongoing surveillance.[6]

ESR values were highest among patients with malignancies, consistent with existing literature that links elevated inflammatory markers to neoplastic activity. The significant correlations between ESR and age in both genders underscore aging's influence on baseline inflammatory activity. Notable sex differences in ESR across some diagnostic groups may relate to hormonal or physiological differences and require further study.[7]

ESR remains a fundamental screening and monitoring tool due to its simplicity, affordability, and broad applicability, especially in resource-constrained settings where specialized tests may not be universally available. Its use, in conjunction with clinical assessment and more specific markers, optimizes patient evaluation.8

CONCLUSION

The erythrocyte sedimentation rate is a valuable, low-cost marker for inflammation and disease activity monitoring across a variety of clinical contexts. This study confirms its diagnostic relevance across infectious, inflammatory, hematological, malignant, and other disorders, and highlights the need to consider age and gender variations in interpretation. ESR's continued use is recommended, particularly in developing countries, to complement more advanced diagnostic strategies.

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