

Comparison between ESR and C-Reactive Protein(CRP) as a Marker of Disease activity in Patients with Rheumatoid Arthritis

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ABSTRACT

Background: Laboratory tests such as the erythrocyte sedimentation rate(ESR) and C-reactive protein (CRP) have been used as markers of inflammation and disease activity in rheumatoid arthritis (RA), although there is still no clear consensus on when to use one, the other, or both. **Objective:** To determine ESR and CRP values in active RA patients and their correlation with different parameters of disease activity. **Patients and Methods:** Eighty patients with active RA, attending rheumatology department at Benha Teaching Hospital, diagnosed according American College of Rheumatology (ACR) and European League Against Rheumatism (EULAR) revised criteria were included. The patients' tender and swollen joint counts were calculated. Laboratory investigations were done including ESR by Westergren method and CRP by ELISA method, assessment of disease activity using DAS28 score. **Results:** All patients showed disease activity at time of the study, their DAS28 score was ranged from 2.9 to 7.5 (Mean±SD 5.42±1.1). The values of ESR was ranged from 10 to 150 mm/h in first hour (Mean ±SD 52.9±33.9). CRP was positive in 54 patients but negative in 26 (67.5% versus 32.5%), the CRP values was ranged from 0.6 to 65 mg/dl (Mean±SD 18.1±15.8). There were statistically significant correlation between DAS28 values and number of tender & swollen joints and ESR values (P-value was <0.001, <0.001, 0.004 respectively), on the other hand there was no significant correlation between DAS28 patients age and CRP values (P value was 0.60, 0.18 respectively). **Conclusion:** our study suggests that CRP is not a viable marker in the clinical setting to monitor inflammatory activity in the RA patient, and that the role of and dependence on CRP as a marker of inflammation in RA patients in everyday practice should be re-evaluated. [Egypt J Rheumatology & Clinical Immunology, 2015; 3(1): 77-81]

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic systemic disease, usually manifesting as inflammation of multiple joints. It is characterized by a number of extra-articular manifestations, including rheumatoid nodules, vasculitis, heart or lung disease, anemia, and peripheral neuropathy. Although the cause of RA is unknown, it is generally considered an autoimmune disease. At present, no single test of disease activity in RA is effective because RA may cause various kinds of symptoms and signs¹.

Different measures are used for evaluating disease activity in rheumatoid arthritis (RA). Laboratory tests such as the erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) have been an integral part of the clinicians' repertoire for many years, used as markers of inflammation, although there is still no clear consensus on when to use one, the other, or both². Among these tests CRP had become the more preferred serological marker for evaluating acute disease activity³.

Disease activity score (DAS) and its derivatives use ESR or CRP as part of their score and as such they have found increased use and discussion regarding their role in disease activity assessment. Because of the way these indices are calculated, ESR and CRP may play a disproportionately significant role in the overall score⁴.

Monitoring of RA patients is difficult in some cases as up to 40% of patients have normal ESR or CRP at presentation⁵, which makes it hard to use these measures in close to half of active, treatment requiring RA patients. The quantitative usefulness of ESR versus CRP has been evaluated in many studies with no clear consensus. ESR and/or CRP are part of the American College of Rheumatology (ACR) core data set for measuring disease activity in RA and have been used in clinical trials as the main laboratory marker of disease activity in RA².

Aim of The Study

The aim of this study was to determine ESR and CRP values in active RA patients and their correlation with different parameters of disease activity.

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PATIENTS AND METHODS

The study was carried out on eighty patients with active RA, attending rheumatology department at Benha Teaching Hospital these patients were diagnosed according American College of Rheumatology (ACR) and European League Against Rheumatism (EULAR) revised criteria⁶.

The patients were subjected to thorough general and articular examination. Tender and swollen joint counts were calculated. Laboratory investigation were done including ESR by Westergren method⁷ and CRP by ELISA method⁸, assessment of disease activity using DAS28 score⁹.

Statistical Analysis:

The collected data were tabulated and analyzed using SPSS version 16 soft ware (Spss Inc, Chicago, ILL Company). Categorical data were presented as number and percentages while continuous data were expressed as mean, standard deviation and range. Spearman's correlation coefficient (ρ) and Man Whitney U test were used as tests of significance. The accepted level of significance in this work was stated at 0.05 ($P \leq 0.05$ was considered significant)

RESULTS

Eighty RA patients were included in this study; they were seventy two females and eight males. Their ages ranged from 25 to 69 years (Mean \pm SD; 47.7 \pm 11.3). All patients showed disease activity at time of the study, their DAS28 score was ranged from 2.9 to 7.5 (Mean \pm SD 5.42 \pm 1.1). Comparison between male and female patients as regards DAS28, showed that there was statistically significant differences between both groups ($P=0.031$).

The values of ESR was ranged from 10 to 150mm/h in first hour (Mean \pm SD 52.9 \pm 33.9). CRP was positive in 54 patients but negative in 26 (67.5% versus 32.5%), the CRP values was ranged from 0.6 to 65 mg/dl (Mean \pm SD 18.1 \pm 15.8).

DAS28 values were correlated with variable clinical and laboratory data in the studied group, there were statistically significant correlation between DAS28 values and number of tender & swollen joints and ESR values (P value was < 0.001 , < 0.001 , 0.004 respectively), on the other hand there was no significant correlation between DAS28 patients age and CRP values (P value was 0.60, 0.18 respectively).

Table 1. Basic characters of the studied sample.

	Variable	No. (N=80)	% (100.0)
Gender	Male	8	10.0
	Female	72	90.0
	Mean \pm SD	Min.	Max.
Age	47.7 \pm 11.3	25	69
TJC	13.8 \pm 9.6	0	28
SJC	2.15 \pm 4.9	0	22
DAS	5.42 \pm 1.1	2.9	7.5
ESR	52.9 \pm 33.9	10	150
CRP	18.1 \pm 15.8	0.6	65
	Positive	54	67.5
	Negative	26	32.5

TJC tender joint count, *SJC* swollen joint count, *ESR* erythrocyte sedimentation rate, *CRP* c-reactive protein.

Table 2. Comparing DAS among males and females

	Sex	N	Mean \pm SD	"Z" of MWU	P
DAS	Male	8	6.32 \pm 1.224	2.15	0.031*
	Female	72	5.32 \pm 1.053		

DAS disease activity score

Table 3. Correlation between DAS and the studied variables.

	DAS	
	rho	P
Age	-0.06	0.60 NS
TJC	0.839	<0.001** HS
SJC	0.545	<0.001**HS
ESR	0.316	0.004*S
CRP	0.151	0.18 NS

TJC tender joint count, *SJC* swollen joint count, *ESR* erythrocyte sedimentation rate, *CRP* c-reactive protein, *NS* non significant, *S* significant, *HS* highly significant.

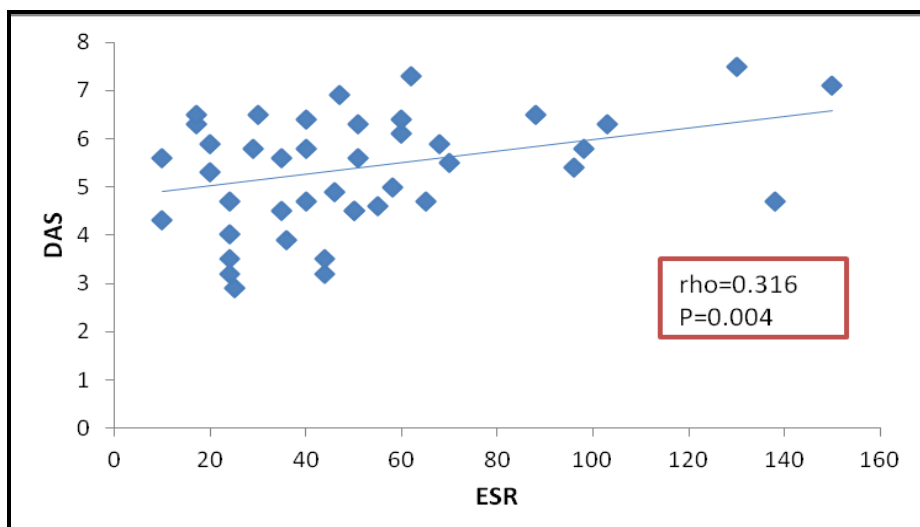


Figure 1. Correlation between DAS28 and ESR.

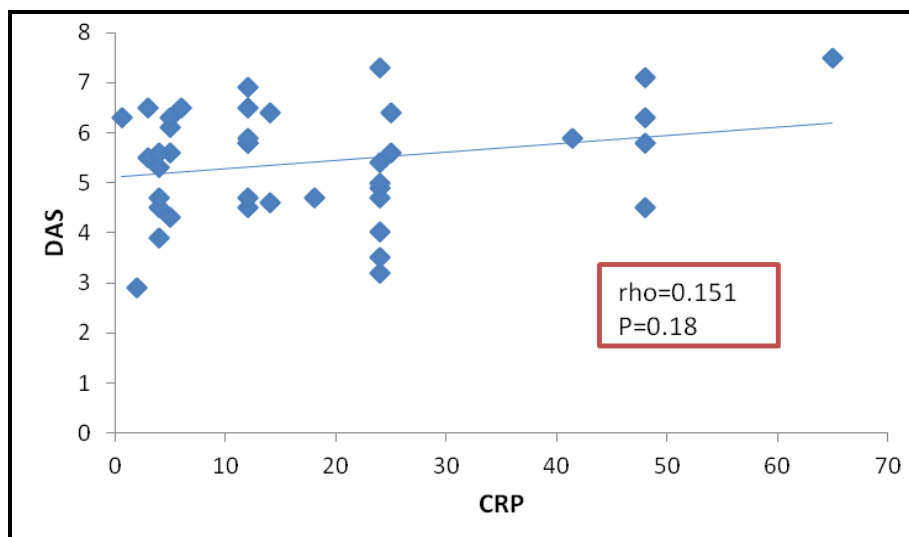


Figure 2. Correlation between DAS28 and CRP.

DISCUSSION

ESR and CRP originally were used to assess activity and response to treatment in inflammatory diseases such as RA¹⁰.

In this study we aimed to determine ESR and CRP values in active RA patients who attending rheumatology department Benha teaching hospital and their correlation with different parameters of disease activity.

Eighty patients with active RA were included in the study, they were seventy two females and eight e males. Mean DAS among patients was 5.24±1.1; mean ESR and CRP were 18.1±15.8 and 52.9±33.9 respectively.

ESR was statistically correlated with DAS of the RA patients whereas CRP values and DAS were not ($P= 0.004, 0.18$ respectively). At the same time there was no significant correlation between ESR and CRP among the included RA patients. These results coincide with a study published at 2010; it stated that ESR and CRP cannot be used in the diagnosis of RA because 45% of patients may have normal serum levels at presentation, although these values represent part of the diagnostic syndrome or classification criteria sets¹¹.

Longitudinal study conducted between 1980 and 2004 analyze erythrocyte sedimentation rate, C-reactive protein ,and rheumatoid factor (RF) tests in 2 databases of consecutive patients with rheumatoid arthritis (RA) over 25 years, in Finland and the USA, a majority of patients with RA seen had abnormal ESR, CRP, or RF. However, more than 37% of patients had ESR < 28 mm/h, normal CRP, or all negative RF tests. Similarities of laboratory test data at 2 sites on different continents with different duration of disease suggest generalizability of the findings. Normal ESR, CRP, and RF are seen in a substantial proportion of patients with RA at this time¹².

On the other hand, JEFFREY et al (2012) demonstrated a significant association between the MBDA (multi-biomarker disease activity) and the DAS28-CRP in heterogeneous groups of RA patients with diversity in autoantibody status, disease activity, and RA therapy in RA patients receiving care in multiple clinical centers¹³.

Absence of significant correlation between CRP and disease activity in the current study disagreed with a previous study which ensure that serum CRP, among the various RA patients, is the most useful biochemical marker for evaluating the disease activity of patients with RA¹. Some authors reported that ESR and CRP values were weakly correlated with disease activity measures. These data suggested that another look at the role of ESR and CRP as markers of

inflammation in RA patients seen in routine care may be in order².

Despite the elevation of individual components of the Clinical Disease Activity Index (CDAI) (tender and swollen joint counts and patient and physician global assessment), some patients with active RA may have normal erythrocyte sedimentation rate (ESR) and/or C-reactive protein (CRP) levels and thus fail to meet entry criteria for clinical trials¹⁴.

Existence of RA patients with depressed CRP concentrations caused by carrying low-CRP–associated genetic variants must be taken into account when this test is used universally¹¹.

ESR is a reflection of Fibrinogen level in the blood, so conditions that elevate fibrinogen, even if they are not necessarily considered inflammatory, can raise ESR. These include pregnancy, diabetes, end-stage renal disease, and heart disease. Major increases in the concentration of a single molecular species, such as a monoclonal immunoglobulin in multiple myeloma, also cause increased sedimentation¹⁰. However, microcytosis, polycythemia, and abnormally shaped RBCs (e.g., sickle cells, spherocytes) hinder aggregation and lower the ESR¹⁵.

The ESR is elevated, in obesity, as is CRP, presumably as a result of IL-6 secretion by adiposities¹⁶.

In conclusion, we suggest that CRP is not a viable marker in the clinical setting to monitor inflammatory activity in the RA patient, and that the role of and dependence on CRP as a marker of inflammation in RA patients in everyday practice should be re-evaluated.

[Disclosure: Authors report no conflict of interest]

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