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Original Research Paper

Clinical disease activity correlation with CRP and ESR in a sample of rheumatoid arthritis Iraqi patients

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ABSTRACT:
Introduction: Rheumatoid arthritis is a systemic autoimmune disease that is distinguished by persistent inflammation of the synovium, which ultimately results in the loss of joints and bone degradation. **Aim of study**: This investigation was carried out with the purpose of determining CRP and ESR in a sample of rheumatoid arthritis Iraqi patients and to correlate them with clinical disease activity. **Subjects and methods**: A total of 100 RA patients took part in the study, and they were matched up with 50 healthy individuals of the same age and gender to serve as controls. **Results**: Average CRP and ESR levels in RA patients were marginally higher in the presence of moderate and high disease activity compared to low disease activity. None of the changes were statistically significant, however. **Conclusion**: the analysis that was carried out demonstrated that both ESR and CRP are useful in the clinical practice of rheumatologists.

Keywords: Rheumatoid arthritis, CRP , ESR

INTRODUCTION:

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disease that affects all ethnic groups around the globe. It is distinguished by persistent inflammation of the synovium, which ultimately results in joint destruction and bone erosions (1). The ratio of women to men is three to one, and the prevalence of RA ranges from 0.5 percent to 1 percent of the general population globally (2). Clinical symptoms, radiographic findings, and laboratory findings are the primary factors considered when making a diagnosis of rheumatoid arthritis (RA) (3). The 2010 ACR/EULAR Classification Criteria for RA have been used as the basis for the categorization of RA (4). The Clinical Illness Activity Index (CDAI) is a brand-new and straightforward instrument for measuring the severity of RA disease (5). Another prominent method for determining disease activity in RA is the Disease Activity Score of 28 Joints, or DAS28 (6). The erythrocyte sedimentation rate, often known as the ESR, is the acute phase indicator that has been around the longest. In the 20th century, the erythrocyte sedimentation rate was most likely the laboratory test that was used the most often. At present, the clinical value of ESR is being called into doubt, while the level of C-reactive protein (CRP) is being extensively employed. The test for C-reactive protein has seen a resurgence in popularity over the last two decades as a result of the revelation that inflammation plays a role in atherosclerotic disease (2). Rheumatology is one of the medical specialties that continues to make use of the erythrocyte sedimentation rate (ESR) test, despite the fact that its importance in current diagnostics has decreased. In addition, the ESR or CRP may serve as the foundation for some disease activity indicators. This is true for the DAS and DAS28 indices, which are used to assess the level of activity associated with rheumatoid arthritis (3). The number of individuals suffering from various rheumatic conditions was divided into groups to determine how accurately ESR and CRP can measure the progression of the illness. According to the findings of De Vries et al. (4), both ESR and CRP (in addition to serum amyloid A) were significantly associated with the Bath Ankylosing Spondylitis Activity Index (BAASAI) in a sample of 15 155 patients diagnosed with ankylosing spondylitis; however, the association between ESR and BAASAI

was the most robust. According to a study done by Ruof and Stucki (5), the erythrocyte sedimentation rate and the C-reactive protein have both been demonstrated to be sensitive indicators of disease activity in individuals who suffer from rheumatoid arthritis. ESR or CRP may be used to determine the disease activity score for juvenile rheumatoid arthritis; however, Nordal et al. (6) discovered that the data obtained using either method for calculating the score led to fairly similar conclusions. Therefore, they suggested using both of them to evaluate the disease activity of individuals who suffered from juvenile idiopathic arthritis. Several additional publications point to comparable shifts in ESR and CRP in a variety of disorders, such as systemic lupus erythematosus (SLE) (7) and rheumatoid arthritis (RA) (7, 8).

Subjects and methods:

100 RA patients comprising 96 females and 4 males meeting the classification criteria of (the 2010 American College of Rheumatology/European League Against Rheumatism for Rheumatoid Arthritis) were included in this case-control study and compared to 50 age and sex-matched healthy controls.

Exclusion criteria:

•Overlapping or mimicking connective tissue disorders.

•Patients suffering from diabetic mellitus, bone fractures, malignant illnesses, renal and hepato-biliary diseases .

The diagnosis was ruled out after a thorough review of the patient's medical history, physical examination, and investigations.

Individuals from both groups had their blood drawn via aseptic venipuncture, and then 5 milliliters of their blood were drawn .

The erythrocyte sedimentation rate (ESR) should be between 0 and 20 mm/H, the serum alanine transaminase (ALT) should be between 14 and 63 IU/L, and the C-Reactive Protein, often known as CRP, as well as Rheumatoid Factor (RF).

The Clinical Disease Activity Index (CDAI) and the Disease Activity Score 28 were used to determine the level of disease activity (DAS 28).

Examination of Statistics:

Version 23 of SPSS was used to do the data analysis. The categorical data had been expressed via the use of numbers and percentages, while the numerical data had been expressed through the use of the mean and the standard deviation. To determine whether or not a result was significant, an ANOVA, an independent student test, a Pearson correlation test, and a Chi-square test (or a Fisher exact test where that option was unavailable) were employed.

Considered statistically significant where the P-value was lower than or equal to (0.05).

RESULTS:

You can see the breakdown of the two groups' demographic characteristics in Table 1. As yet, no distinguishing characteristics between the two groups have been identified. The average illness duration was 9.2±2.3 years. Results indicated that 9 percent of patients had low disease activity, 46 percent had moderate disease activity, and 45 percent had high disease activity, as measured by the DAS28. Ten percent of patients were found to have low disease activity according to CDAI findings, while 56 percent were classified as having moderate disease activity and 34 percent as having high disease activity.

Table 1. Demographic characteristics of RA patients and controls

		Control		Patients		P-value
Number		50		100		
Age/year		44 ± 11		48±12		0.7
Gender	Male	4	8 %	4	4.0 %	0.5
	Female	46	92 %	96	96.0 %	
BMI kg/m^2		29.9 ± 5.8		28.9 ± 4.9		0.4
Occupation	Employed	9	18.0 %	16	16.0 %	0.7
	Non-employed	41	82.0 %	84	84.0 %	
Smoking	Non-smoker	46	92.0 %	95	95.0 %	0.1
	Smoker	2	4.0 %	5	5.0 %	
	Ex-smoker	2	4.0 %	0	0.0 %	

BMI= Body mass index, RA= Rheumatoid Arthritis

Table 2 displays the clinical and laboratory features of a group of RA patients. Rheumatoid factor was positive in 87% of patients with RA, CRP was high in 45% of patients but negative in 26% of patients, and it was not assessed in 29% of the patient group.

Table 2. Clinical features of Rheumatoid arthritis patients group

Variable		patients	
		No.	%
RF	Positive	87	87
	Negative	13	13
CRP	Positive	45	45
	Negative	26	26
	Not done	29	29
ESR mm/H	Normal	17	17
	Increased	83	83
Disease duration in years		9.0 ± 2.3SD	
DAS28	**Low**	9	9
	Moderate	46	46
	High	45	45
CDAI	**Low**	10	10
	Moderate	56	56
	High	34	34

Patients are highly variable in the drugs being taken as shown in table 3 which shows the treatment taken by patents in terms of patients numbers and the percentage of those patients from the whole sample of patients

Table 3: illustrates the treatment used by patients in terms of patients numbers and percentages from whole sample of patients

Biologics	**No.**	**(%)**
Infliximab	2	2%
Rituximab	12	12%
Etanercept	50	50%
Total	64	64%
None	36	36%
DMARD	**No**	**(%)**
Azathioprine	6	6%
MTX	66	66%
Leflunomide	4	4%
HCQ	8	8%
MTX & HCQ	5	5%
Total	89	89%
None	11	11%
NSAID	**No**	**(%)**
Diclofenac NA	5	5%
Meloxicam	9	9%
Naproxen	3	3%
Total	17	17%
None	83	83%
Steroids	47	47 %

Table.4; correlation of ESR with CDAI and DAS28

		ESR		ESR
CDAI	**Pearson Correlation**	0.17	**DAS28**	0.26
	p-value	0.09		0.009

Table.5; mean value of CDAI of patients group according to sociodemographic and clinical characteristics

		CDAI		P-value
		Mean	SD	
NSAID	Yes	21.4	11.5	0.6
	No	20.3	8.5	
Steroid using	Yes	19.3	8.2	0.2
	No	21.5	9.6	
DMARD using	Yes	20.6	9.2	0.6
	No	19.5	7.7	
Biological using	Yes	19.8	7.8	0.3
	No	21.6	10.9	
CRP	Positive	20.8	9.3	0.7
	Negative	20.2	8.1	

Table 6: mean value of DAS28 of patients group according to sociodemographic and clinical characteristics

		DAS28		P-value
		Mean	SD	
NSAID	Yes	5.09	1.54	0.6
	No	4.95	1.11	
Steroid using	Yes	4.78	1.18	0.1
	No	5.15	1.17	
DMARD using	Yes	5.01	1.21	0.08
	No	4.71	0.98	
Biological using	Yes	4.83	1.04	0.7
	No	5.24	1.38	
CRP	Positive	5.80	1.06	0.5
	Negative	5.00	1.16	

DISCUSSION:

Plasma viscosity, or to be more specific, the albumin/globulin ratio, shifts when there is an acute phase response, and this shift is likely the component that has the most substantial impact on ESR. The amount of fibrinogen in the serum is an additional component that has an effect on ESR (9). The examination is uncomplicated and extremely reasonably priced. C-reactive protein is a protein that is produced during the acute phase of the disease and is a member of the highly conserved pentraxin family. Hepatocytes are responsible for the production of C-reactive protein, and interleukin-6 is the primary factor that controls the transcription of this gene. Some of the recognized biological roles of CRP include the activation of complement via the classical route, a contribution to the opsonization and phagocytosis of certain bacteria, and the clearance of necrotic cells (10). These actions are only partly characterized.

Our research did not uncover any significant gender differences in the acute phase reactants that were studied between the male and female patients. The ESR levels of female patients with early RA were shown to be higher in studies (9). The ESR has been shown to be significantly higher in women than in males, which is consistent with the results of earlier studies (11). There is no consensus that can be agreed upon on the difference in serum CRP levels between the sexes. While some studies found that males had greater values, other studies found the complete reverse to be true (12, 13). These results coincide with those from our investigations, which indicate that older patients had greater ESR and CRP levels (9). It is essential to take this into mind since the disease activity that is assessed based on acute phase reactants may be inaccurately high. In spite of the fact that ESR and CRP are affected by a variety of conditions, a substantial positive connection was discovered between the tests in all of the patients who were evaluated, particularly in those who had ankylosing spondylitis and systemic lupus erythematosus. The association between ESR and CRP is not as obvious in individuals who have SLE, and an increase in inflammatory markers is regarded to be a factor associated with a worse prognosis (14). As was said earlier, the sample of SLE patients who participated in the current research was on the smaller side, but they did exhibit a robustly positive association between their ESR and CRP levels.

The findings lend credence to the theory that it is possible to calculate disease activity indices for specific conditions, such as rheumatoid arthritis,

juvenile idiopathic arthritis, and ankylosing spondylitis, using both the erythrocyte sedimentation rate and the C-reactive protein simultaneously. This observation coincides with the recommendation made by Kay et al. (15) to get both ESR and CRP from patients suffering from rheumatoid arthritis during the first visit to the doctor's office. It has also been noted that these individuals exhibit a correlation between the acute phase response and the radiological development of the illness (16). Similar findings were found in individuals with spondyloarthropathies; however, the spectrum of the acute response was often lower in these patients (17).

CONCLUSION:

In conclusion, the analysis that was carried out demonstrated that both ESR and CRP are useful in the clinical practice of rheumatologists; however, it is essential to remember that an understanding of the various underlying mechanisms that contribute to improved test results is required at all times.

REFERENCES:

1. Bellucci E, Terenzi R, La Paglia GM, Gentileschi S, Tripoli A, Tani C, et al. One year in review 2016: pathogenesis of rheumatoid arthritis. Clin Exp Rheumatol. 2016;34(5):793-801.
2. Ralston SH, Penman ID, Strachan MWJ, Hobson R. Davidson's Principles and Practice of Medicine E-Book: Elsevier Health Sciences; 2018.
3. Poddar A, Behera DD, Ray S. Serum alkaline phosphatase activity & serum calcium levels: an assessment tool for disease activity in rheumatoid arthritis. IJBAMR. 2016;5(4):1324.
4. Aletaha D, Neogi T, Silman AJ, Funovits J, Felson DT, Bingham Iii CO, et al. 2010 rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. Arthritis & rheumatism. 2010;62(9):2569-81.
5. Gorial FI. Validity and reliability of CDAI in comparison to DAS28 in iraqi patients with active rheumatoid arthritis. Journal of the Faculty of Medicine Baghdad. 2012;54(3):231-3.
6. Alchy EM, Gorial FI, Majeed IA, Hussain SA. Validity of simplified disease activity index using CRP titer in comparison to disease activity score-28 joints in Iraqi patients with active Rheumatoid arthritis. J Exp Integr Med. 2012;2(3):231-6.
7. Suryawan A, Nuartha A, Purwata TE, Samatra DPGP, Widyadharma IPE. Low Adjusted Serum Calcium Level as a Predictor of Poor Outcome in Patient With Acute Ischemic Stroke. IJSR. 2017;6(4):638-41.
8. Chandrakar BL, Harish CS, Chandrakar KS. Activity of serum alkaline phosphatase in rheumatoid arthritis for diagnosis and management. Int J Med Res Prof. 2017;3(3):281-4.
9. Siemons L, Ten Klooster PM, Vonkeman HE, van Riel PLCM, Glas CAW, van de Laar MAFJ. How age and sex affect the erythrocyte sedimentation rate and C-reactive protein in early rheumatoid arthritis. BMC musculoskeletal disorders. 2014;15(1):1-7.
10. Ablij HC, Meinders AE. C-reactive protein: history and revival. European Journal of Internal Medicine. 2002;13(7):412-22.
11. Shearn MA, Kang IY. Effect of age and sex on the erythrocyte sedimentation rate. The Journal of Rheumatology. 1986;13(2):297-8.
12. Lee Y-J, Lee J-H, Shin Y-H, Kim J-K, Lee H-R, Lee D-C. Gender difference and determinants of C-reactive protein level in Korean adults. Clinical chemistry and laboratory medicine. 2009;47(7):863-9.
13. Pieroni L, Bastard JP, Piton A, Khalil L, Hainque B, Jardel C. Interpretation of circulating C-reactive protein levels in adults: body mass index and gender are a must. Diabetes & metabolism. 2003;29(2):133-8.
14. Gafter-Gvili A, Leibovici L, Molad Y. Elevation of inflammatory markers in patients with systemic lupus erythematosus is associated with poorer outcome. Biomedicine & Pharmacotherapy. 2013;67(1):48-52.
15. Kay J, Morgacheva O, Messing SP, Kremer JM, Greenberg JD, Reed GW, et al. Clinical disease activity and acute phase reactant levels are discordant among patients with active rheumatoid arthritis: acute phase reactant levels contribute separately to predicting outcome at one year. Arthritis research & therapy. 2014;16(1):1-10.
16. Navarro-Compan V, Gherghe AM, Smolen JS, Aletaha D, Landewe R, van der Heijde D. Relationship between disease activity indices and their individual components and radiographic progression in RA: a systematic literature review. Rheumatology. 2015;54(6):994-1007.
17. Chen C-H, Chen H-A, Liao H-T, Liu C-H, Tsai C-Y, Chou C-T. The clinical usefulness of ESR, CRP, and disease duration in ankylosing spondylitis: the product of these acute-phase reactants and disease duration is associated with

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