



Radiodiagnosis

CLINICAL AND RADIOLOGICAL ASSESSMENT OF DISEASE ACTIVITY IN RHEUMATOID ARTHRITIS

Dr Abhishek Jaiswal

MD (Radio diagnosis) Assistant Professor, Department of Radiology, Saraswati Medical College, Unnao.

Dr Rehan Ahmad*

MD (Radio diagnosis) Professor, Department of Radiology, Saraswati Medical College, Unnao. *Corresponding Author

ABSTRACT

Background: Rheumatoid arthritis is an autoimmune disease. Inflammation of the synovium and destruction of bone and cartilage occurs in RA leading to joint deformities.

Objectives: To assess disease activity clinically by Modified Disease Activity Score (MDAS) of 28 and radiologically by Larsen score in patients of Rheumatoid arthritis (RA).

Material and Methods: A prospective study at a tertiary care hospital over one year duration. RA was diagnosed as per 2010 American College of Rheumatology Criteria (ACR). Disease activity of joints was clinically and radiologically assessed by Modified disease score and Larsen score respectively and results analyzed statistically.

Results: 120 of 200 (60%) patients had RA. Mean age of RA patients was 42.76 years. Female to male ratio was 1.67:1. Disease activity in low (12.5%), moderate (37.5%) and high (16.7%) were significantly more in RA patients as also radiological changes by Larsen score (41.7%).

Conclusion: Rheumatoid arthritis is 1.67 times more common in women. MDAS of 28 joints for clinical assessment and Larsen score for radiological assessment are good predictors to monitor the course of the disease in RA.

KEYWORDS : Rheumatoid Arthritis, Modified Disease Activity Score, Larson score.

INTRODUCTION:

Rheumatoid arthritis (RA) is a multifactorial disease involving genetic and environmental factors including infections.¹ Prevalence of rheumatoid arthritis (RA) is approximately 0.8% (0.3 to 2.1%) of population worldwide.¹ Indian data suggest the prevalence to be around 0.65 to 0.75%.²

Rheumatoid arthritis is an autoimmune disease. Inflammation of the synovium and destruction of bone and cartilage occurs in RA leading to joint deformities. Extra articular manifestations of RA include bursitis, tenosynovitis, keratoconjunctivitis sicca, episcleritis, pleurisy, pericarditis, cardiomyopathy/ myocarditis, glomerulonephritis, compression and peripheral neuropathies etc. Hence, not only an early diagnosis and treatment is necessary to prevent complications but a continual monitoring of the course of the disease is also required to estimate the aggressive nature of the disease and effectiveness of therapy with DMARD.

AIM AND OBJECTIVES:

The present study was aimed to clinically and radiologically assess disease activity in Rheumatoid arthritis.

MATERIAL AND METHODS:

It was a prospective study which was conducted on 200 patients at a tertiary care hospital for duration of one year after approval of institutional ethics committee. Samples were collected by convenient sampling method. A thorough history and clinical examination of patients was undertaken and diagnosis of RA was made as per 2010 American college of rheumatology criteria (ACR).³

The ACR criteria are a scoring system based on the various joint involvement, serological markers (rheumatoid factor, anticyclic citrullinated peptide antibodies), acute phase reactants (CRP, ESR) and duration of disease. A score of ≥ 6 of 10 is need to diagnose a patient as having Rheumatoid arthritis. Disease activity was calculated as per Modified DAS 28.^{4,5} Radiological damage evaluated as per Larsen score.⁶

Modified DAS 28

For DAS 28 following joints were symmetrically assessed for tenderness and swelling.

Proximal Interphalangeal joint	Elbow joint	Shoulder joint
Metacarpophalangeal joint	Wrist joint	Knee joint

And score was calculated as per DAS 28T+28S without GH formula.

DAS 28T + S = (0.56 X $\sqrt{28T}$ + 0.28 X $\sqrt{28S}$ X 0.70 X In ESR) X 1.08 X 0.16.4

(Here, DAS 28T+S= Disease activity score with separate 28-joint counts for tender joints and swollen joints, $\sqrt{28T}$ = Square root of total tender joints in 28 joint count, $\sqrt{28S}$ =Square root of total swollen joints in 28 joint count, ESR= Erythrocyte sedimentation rate.)

Scoring:

No disease activity: <2.6.

Low Disease activity: 2.6-3.2.

Moderate disease activity: 3.2-5.1.

High disease activity: > 5.1.

Radiographic Examination

Radiographic examination of hands and feet was done at first presentation. All radiographs were scored by experienced observer who was unaware of the clinical and laboratory data. The scoring was done by Modified Larsen score.

The grading scale of radiographic examination ranges from:

0 to 5.0= Intact bony outlines and normal joint space.

1= Erosions <1 mm in diameter or joint space narrowing.

2= one or several small erosions (diameter > 1 mm).

3= Marked erosions.

4= Severe erosions (usually no joint space left and the original bony outlines are only partly preserved).

5= Mutilating changes (the original bony outlines have been destroyed. The score is ranges from 0 to 160.

Aseptic collection of 10 ml blood was used for following tests which were performed as per kit literature.

Anti-CCP ELISA kit -AESKULISARA/CP; AESKU Diagnostics.

RA test - Rheumatoid factor Latex slide test kit; Beacon diagnostics.

CRP kit - Avitex CRP kit; Omega diagnostics.

ESR: Westergren method.

Statistical Analysis:

The statistical analysis was performed using SPSS version 20. Frequency of different variants was estimated and statistical analysis was carried out for significance by calculating the 'p' value. The 'p' value < 0.05 was considered to be statistically significant. The quantitative data was expressed as Mean \pm SD and analyzed by using Unpaired 't' test (Student 't' test).

RESULTS:

Of total 200 study cases, 120 (60%) cases were diagnosed as rheumatoid arthritis, whereas 80 (40%) cases were diagnosed as non-rheumatoid arthritis as per 2010 American college of rheumatology

criteria (ACR). In total 120 rheumatoid arthritis patients, maximum cases 60 (50.0%) belonged to age group 41–50 years followed by 40 (33.3%) who belonged to 31–40 years and thereafter 51–60 years 14 (11.6%). Mean age of rheumatoid arthritis patient was 42.75 ± 6.95 years. Female : male ratio was 1.67:1 (table 1).

Table 1: Association between age and gender amongst RA patients

Age group	Gender		Female no. (n=75)		P value
	Male no. (n=45)	%	No	%	
20-30	0	0	05	6.7%	-
31-40	15	33.3%	25	33.3%	0.5
41-50	20	44.4%	40	53.3%	0.75
51-60	10	22.2	04	5.3%	0.03
61-70	0	0	01	1.3%	-

Table 2: Co relation of Modified DAS 28 in RA and non RA

Assessment	RA (n=120)		Non RA (n=80)		P value	Total (n=200)	
	No	%	No	%		No	%
No disease activity <2.6	40	33.3	72	90	-	112	56
Low disease activity 2.6-3.2	15	12.5	05	6.25	0.05	20	10
Moderate DA 3.2-5.1	45	37.5	03	3.75	0.001	48	24
High DA >5.1	20	16.7	00	00	0.001	20	10

Among the 120 rheumatoid arthritis cases, all the three disease activity group; low disease activity 15 (12.5%), moderate disease activity 45 (37.5%) and high disease activity 20 (16.7%) was significantly more in rheumatoid arthritis patients (table 2).

Table 3: Association of Larson score in RA and non RA patients.

Score	RA (n=120)		Non RA (n=80)	
	No	%	No	%
0	70	58.3	80	100
1	50	41.7	0	-
Total	120	100	80	100

In present study, 50 (41.7%) cases among rheumatoid arthritis patients had a Larsen score of 1. Cases of non-rheumatoid arthritis patients did not show any radiological changes as compared to rheumatoid arthritis patients (table 3).

DISCUSSION:

The present study was done to clinically and radiologically assess disease activity in Rheumatoid arthritis. In the present study 60% cases were diagnosed as rheumatoid arthritis as per American college of rheumatology criteria (ACR).

The peak age of onset of rheumatoid arthritis is in the fourth and fifth decades of life, with 80% of all patients developing the disease between the ages 35-50 years.¹ In the present study, out of a total 120 rheumatoid arthritis patients, maximum cases 60 (50.0%) belonged to age group 41–50 years followed by 40 (33.3%) who belonged to 31–40 years and 14 (10.4%) in 51-60 years age group. Mean age of rheumatoid arthritis patients was 42.76 ± 6.95 years. Rajiv Gupta *et al* conducted a study in the year 2009 at AIIMS, New Delhi, where they included a total 114 patients & found the mean age group to be 42 years which is similar to present study.⁸ Karimifar *et al* in 2012 at Isfahan University of medical sciences, Iran, enrolled in his study a total of 90 patients and found the mean age as 48 years.⁹

Women are affected approximately three times more often than men.¹ In the present study, female to male ratio was 1.67:1. Similar gender distribution was seen in a study done by Defang Liu *et al* at China, in 2011 in which, out of total 104 patients, 73.07% were females and the female to male ratio was 2.7:1.¹⁰ N. Del Val Del Amo *et al* conducted a study in 2006 at Spain with 89 subjects and observed female preponderance 71.9%, which is again similar to present study.¹¹ RA incidence varies by age within each sex. Among women, disease occurrence increases from the age of menarche and peaks around menopause; RA is rare in men under age 45.¹² The present study concurs to this fact. There was a wider range of age group involvement in females as compared to males. The youngest female was 26 years and the oldest was 65 years. The youngest male was 34 years and the oldest was 59 years. Although a female preponderance was seen in the age group 41-50 years, it was not statistically significant, whereas a statistically significant male preponderance was seen in the age group 51-60 years.

In the present study, Modified Disease Activity Score (DAS) of 28 joints was calculated to assess the disease activity in involved joints, which was then divided in low, moderate and high disease activity groups. Among the rheumatoid arthritis patients, a statistically significant number of cases were seen among all the three groups. The maximum number of cases; 35.8% were seen with the moderate disease activity followed by 13.2% with high disease activity and then 10.4% with low disease activity (Table 2). Hence, Modified DAS 28 score should be used for examining a patient of rheumatoid arthritis. This would ensure that appropriate treatment can be instituted at the right time to prevent further morbidity. Prevoo *et al* has suggested that DMARD can be started, modified or stopped depending upon the modified disease activity score of 28 joints on periodic review of every 3 months.⁵ N. Del Val Del Amo *et al* conducted a study at Spain in 2006 on 89 patients observed that highest number of patients were in moderate activity group followed by high level and low activity group.¹¹ This concurs with present study. In another study by Karimifar *et al* at Iran in 2012, 90 patients were included out of which maximum number of patients had high disease activity followed by moderate and low disease activity.⁹

Larsen score was used to assess the radiological damage in rheumatoid arthritis patients. In the present study, 50 (41.7%) cases among rheumatoid arthritis patients had radiological changes with Larsen score of 1. The non-rheumatoid arthritis patients did not present with any radiological changes and hence the Larsen score was 0 in this group (Table 3). In present study, the overall Larsen score was low as the duration of disease of the present study population was seen to be 1 year or less. Early in the disease, radiographic evaluations of affected joints are usually not helpful in establishing a diagnosis.¹ But in the present study, radiological changes were observed in spite of a history of less than or equal to one year of disease duration of the study population.

Limitations of study:

As it was a single centre study the results cannot be generalized to entire population. Furthermore comprehensive and multi centric studies including meta analysis of various earlier studies should be done, to have a more meaningful and high impact results.

CONCLUSION:

Rheumatoid arthritis is 1.67 times more common in female as compared to male. RA is observed more commonly in 3rd, 4th and 5th decade of life with a peak observed in 4th decade in women and the 5th decade in men. Modified Disease Activity Score of 28 joints and radiological damage by Larsen score are good predictors of disease activity in patients of Rheumatoid arthritis and hence can be used to monitor progress of disease.

ACKNOWLEDGEMENT:

We extend our sincere thanks to Dr. Abhishek Arun (MD) for his assistance in medical writing. We are also thankful to junior doctors and staff of Saraswati Medical College, Unnao. Special thanks to everyone who participated in the study.

REFERENCES:

- Lipsky PE. Rheumatoid arthritis. In: Braunwald E, Kasper D, Fauci A, Hauser S, Longo D, Jameson J, Localio J. Harrison's Principles of Internal Medicine, 17th edition, 2008, United States of America; McGraw Hill publications. 2008; 2083-94.
- Pisupati PK. Rheumatoid arthritis. Shah S N. API-Text book of medicine. The association of physicians of India. 8th edition, API publication. 2008; 290-294.
- Aletaha D, Neogi T, Silman AJ, Funovits J, Felson DT, Bingham CO 3rd, et al. 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. *Arthritis Rheum.* 2010 Sep; 62(9):2569-81.
- T. Sokka, T. Pincus. Quantitative joint assessment in RA. *Clin. Exp. Rheumatol.* 2005; 23(Suppl.39):558-62.
- M. L. L. Prevoo, M. A. van't Hof, H. H. Kuper, M. A. Leeuwen, L. B. A. Van de Putte, P. L. C. M. Van Riel. Modified disease activity score that include 28 joints counts, Development & validation in a prospective longitudinal study of patients with Rheumatoid Arthritis. *Arthritis & Rheumatism.* 1995 January; 38(1): 44-8.
- Tuulikki Sokka. Radiographic scoring in Rheumatoid arthritis, A short introduction methods. *Bulletin of NYU Hospital for joint diseases.* 2008; 66(2):166-8.
- Rheumatoid arthritis. Section 1, Epidemiology of rheumatoid arthritis. {Internet}. Amsterdam: Silman Alan, Hochberg M. Chapter 2, Descriptive epidemiology of rheumatoid arthritis. Elsevier pp. 15-22. Available from: <https://www.us.elsevierhealth.com/media/us/.../Sample%20Chapters.pdf>.
- Gupta R, Thabrah MM, Aneja R, Kumar A, Varghese T, Chandraseenan PJ. Usefulness of anti-CCP antibodies in rheumatic diseases in Indian patients. *Indian J Med Sci.* 2009 Mar; 63(3): 92-100.
- Karimifar M, Salehi M, Farajzadegan Z. The association of anti-CCP1 antibodies with disease activity score 28 (DAS-28) in rheumatoid arthritis. *Adv Biomed Res.* 2012; 1:30.
- Defang L, Mingyang G, Mingdong Y, Yan J, Jun Z, Yong L *et al*. Diagnostic value of serum and joint fluid anti-CCP (citruilline-containing peptide) antibody for rheumatoid arthritis and its relationship with other inflammatory indicators. *Scientific Research and Essays.* 2011 June; 6(12): 2465-69.

11. Del Val del Amo N, Ibanez Bosch R, Fito Manteca C, Gutierrez Polo R, Loza Cortina E. Anti-cyclic citrullinated peptide antibody in rheumatoid arthritis: relation with disease aggressiveness. *Clin Exp Rheumatol*. 2006 May-Jun; 24(3):281-6.
12. Jawaheer D, Lum RF, Gregersen PK, Criswell LA. Influence of male sex on disease phenotype in familial rheumatoid arthritis. *Arthritis Rheum*. 2006 Oct; 54(10):3087-94. PubMed PMID: 17009227