Original Research Paper

Volume : 5 | Issue : 8 | August 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Clinical and Radiological Assessment of Disease Activity in Rheumatoid Arthritis

Medical Science

KEYWORDS : Rheumatoid arthritis, Modified Disease activity score of 28, Larsen score.

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ABSTRACT

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

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: *106 of 180 (58.9%) patients had RA. Mean age of RA patients was 42.76 years. Female to male ratio was 2.7:1. Disease activity in low (10.4%), moderate (35.8%) and high (13.2%) were significantly more in RA patients as also radiological changes by Larsen score (38.7%).*

Conclusion: *Rheumatoid arthritis is 2.7 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.*

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, keratoconjinctivitis 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.

Aims and Objectives:

To clinically and radiologically assess disease activity in Rheumatoid arthritis.

Methods & Materials:

A prospective study, on 180 patients was conducted 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 √28T + 0.28 X √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, √28T= Square root of total tender joints in 28 joint count, √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 to5.0= 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 -AESKULISA RA/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 ± SD and analyzed by using Unpaired 't' test (Student 't' test).

Results:
Of total 180 study cases, 106 (58.9%) cases were diagnosed as rheumatoid arthritis, whereas 74 (41.1%) cases were diagnosed as non-rheumatoid arthritis as per 2010 American college of rheumatology criteria (ACR).

In total 106 rheumatoid arthritis patients, maximum cases 53 (50.0%) belonged to age group 41–50 years followed by 36 (34.0%) who belonged to 31–40 years and thereafter 51-60 years 11(0.10%). Mean age of rheumatoid arthritis patient was 42.76 ± 6.95 years. Female:male ratio was 2.7:1(table 1).

Table 1: Association between age and gender among RA patients

Age group (years)	Gender				P value
	Male (n=29) No.	%	Female (n=77) No.	%	
20-30	-	-	5	6.5	-
31-40	9	31.0	27	35.1	0.696
41-50	14	48.3	39	50.6	0.827
51-60	6	*20.7	5	6.5	*0.032
61-70	-	-	1	1.3	-

By Chi square test. *Significant

In present study, females having rheumatoid arthritis ranged over wider span of age group; from 26 to 65 years., whereas males having rheumatoid arthritis ranged from 34 to 59 years. Although there was a female preponderance 39 (50.6%) in age group 41-50 years as compared to males 14 (48.3%); there was a statistically significant male preponderance 6 (20.7%) seen in 51-60 year age group (table 1).

Among the 106 rheumatoid arthritis cases, all the three disease activity group; low disease activity 11 (10.4%), moderate disease activity 38 (35.8%) and high disease activity 14 (13.2%) was significantly more in rheumatoid arthritis patients (table 2).

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

Assessment	RA (N=106) NO.	%	non-RA (N=74 NO.	%	P value	TOTAL (N=180) NO.	%
No disease activity <2.6	43	40.6	67	90.5	-	110	61.1
Low disease activity 2.6-3.2	11	*10.4	2	2.7	*0.05	13	7.2
Moderate DA 3.2-5.1	38	*35.8	5	6.8	*0.001	43	23.9
High DA >5.1	14	*13.2	-	-	*0.001	14	7.8

By Chi square test. *Significant

In present study, 41 (38.7%) 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).

Table 3: Association of Larsen score in RA and non-RA patients

Score	RA (N-106) NO.	%	Non-RA (N-74) NO.	%
0	65	61.3	74	100.0
1	41	38.7	-	-
Total	106	100.0	74	100.0

Discussion:
The present study was done to clinically and radiologically assess disease activity in Rheumatoid arthritis. In the present study 58.9% cases were diagnosed as rheumatoid arthritis as per American college of rheumatology criteria (ACR).

The following gives the incidence of Rheumatoid arthritis in various epidemiological studies.[7]

Year	Country	Type of study	Age (years)	Incidence per 100000
1993	US	Review of medical records	>18	42
1994	France	Identified from OPD patient at practitioner	20-70	8.8
1987-96	Norway	Hospital records	≥20	28.7
1997	Greece	Patient record review	≥16	15-36
1998	Norway	Postal Survey	20-79	25.7
1999	Japan	Longitudinal population based study	All	8
2001	Finland	Central hospital district	>16	31.7
2002	US	Inception cohort of Rochster residents	≥18	44.6
2002	Sweden	Hospital referrals	>16	24

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 106 rheumatoid arthritis patients, maximum cases 53 (50.0%) belonged to age group 41–50 years followed by 36 (34.0%) who belonged to 31–40 years and 11(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

Volume : 5 | Issue : 8 | August 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

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 2.7:1. 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, 41 (38.7%) 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.

Conclusion:

Rheumatoid arthritis is 2.7 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.

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