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Study on Clinical-Radiological Profile of Patients with Sero-Negative And Sero-Positive Rheumatoid Arthritis According to the Eular Criteria

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Abstract
Aims: *Study On Clinical-Radiological Profile Of Patients With Sero-Negative And Sero-Positive Rheumatoid Arthritis According to the EULAR Criteria.*
Methods: *This is a analytical observational study where we proposed to analyse the clinical features in respect to the work disability and functional impairment as well as the radiological progression /damage in two groups of seronegative and the seropositive subjects*
Results: *This study was conducted to correlate the clinical and radiological changes between Seronegative and Seropositive rheumatoid arthritis diagnosed according to the EULAR criteria.Maximum patients were between 61 to 70 age group in the Seronegative group forming 38.07%, whereas in the Seropositive subjects it is 61 to 70 years forming 33.93% and also 51 to 60 years forming 25% of the total age group.Females formed the major group constituting 69.6 % as compared to 30.35% of males.EULAR scores were greater in the Seropositive subjects (7.35±1.048) as compared to Seronegative subjects (6.59±0.696)Pain scale was higher in the Seropositive subjects (65.32 ±16.95 with P<0.0001)as compared to the Seronegative subjects (36.11 ±21.70) Wellness scale was greater in the Seronegative subjects assessed by the examiner (62.97 ±21.34) as compared to the Seropositive subjects which was 40.42 ±18.59. Health assessment questionnaire (HAQ-DI) scores were greater in the Seropositive subjects 92.07 ±0.491) as compared to the Seronegative subgroups which is 0.959 ±0.451.Disease activity index 28 (DAS28) score was higher in Seropositive subgroup (5.05±0.812) as compared to to Seronegative subgroup which was 3.18 ±0.715.*
Conclusions: *In our study maximum patients belonged to the 60 to 70 age group that were diagnosed as RA, who were further classified as seronegative and seropositive subgroups.The seropositive subgroup showed more clinical disease and disability progression as compared to the seronegative subgroup when compared with the various disease activity indices and scoring systems for Rheumatoid arthritis at the given point of time.Similarly, radiological progression or erosions was seen to be more in the seropositive subgroup where maximum patients were grouped under the grade 5 class of Larsen's scoring system, whereas for the seronegative subgroup, maximum patients had progression only upto class 3 of larsen's indicating a more pronounced radiological damage in SP subgroup at the given point of time.*
Our study observations point to a greater clinical and radiological rheumatoid disease activity in cases which are seropositive as compared to the seronegative counterparts in the study when different appropriate scoring systems and scales were properly applied .

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I. Introduction

RA is a chronic inflammatory disorder characterized by deforming symmetrical polyarthriris of varying extent and severity associated with synovitis of joints and tendon sheaths, articular cartilage loss, erosion of juxta-articular bone, osteopenia affecting synovial joints as well as extra-articular structures and is the most common type of inflammatory arthritis worldwide. RA most commonly involves the small joints of hands and feet, often in a symmetrical distribution resulting in pain, stiffness and loss of function. RA has a wide clinical spectrum ranging from mild joint symptoms to severe inflammation and damage to joints. RA is diagnosed on clinical, serological and radiological grounds. TheAmerican Rheumatism Association (ARA) first proposed classification criteria for RA in 1956 and then revised them in1958 ([1,2)]. Although, these criteria were widelyused

to diagnose RA for many years, they were heavily criticised for their lack of sensitivity and specificity. The ARA published revised classification criteria for RA in 1988, based on cross-sectional data from a large group of patients with rheumatoid and other types of inflammatory arthritis [(3).]

Criterion	Definition
1. Morning Stiffness	Morning stiffness in and around the joints lasting at least 1 hour before maximal improvement
2. Arthritis of three or more joint areas	At least three joint areas simultaneously having soft tissue swelling or fluid (not bony overgrowth alone) observed by a physician (the 14 possible joint areas are [right or left] PIP, MCP, wrist elbow, knee, ankle and MTP joints)
3. Arthritis of hand joints	At least one joint area swollen as above in wrist, MCP, or PIP joint
4. Symmetric arthritis	Simultaneous involvement of the same joint areas (as in criterion 2) on both sides of the body (bilateral involvement of PIP, MCP, or MTP joints is acceptable without absolute symmetry)
5. Rheumatoid nodules	Subcutaneous nodules over bony prominences or extensor surfaces, or in juxta-articular regions, observed by a physician
6. Serum rheumatoid factor	Demonstration of abnormal amounts of serum "rheumatoid factor" by any method that has been positive in less than 5 percent of normal control subjects
7. Radiographic changes	Changes typical of RA on PA hand and wrist radiographs, which must include erosions or unequivocal bony decalcification localized to or most marked adjacent to the involved joints (osteoarthritis changes alone do not qualify)

For classification purposes, RA is diagnosed if a patient satisfies 4 out of 7 criteria from the above table and criteria 1 to 4 must be present for at least 6 weeks.

However, these criteria were based on data from patients with established disease and it is widely recognised that some of these features may be absent during early stages of the disease which lead to an revision of the criteria by European league of rheumatology forming a ACR/EULAR 2010 criteria**.** Since the introduction of the new 2010 ACR/EULAR classification criteria for RA, there have been many published studies from many different countries that have addressed the performances of these criteria. The goal of the new criteria to classify newly presented patients earlier as suffering from RA seems to be met. However, exclusion of other diagnoses is essential. As there is no gold standard for the diagnosis of RA, 100% accuracy can never be reached and increased sensitivity comes at the price of loss of specificity. . The sensitivity and specificity of the 2010 criteria in classifying RA were 97 and 55%, respectively, compared with the 1987 RA criteria, which were 93 and 76%, respectively (3.3) Especially, when the classification criteria are used as diagnostic criteria, this carries the risk of overtreatment. It remains to be determined whether or not the new criteria when used to diagnose and treat patients provide an acceptable balance between efficacy and safety and in these days also of major importance, cost-effectivenessVan de Sande et al. describe features of synovial inflammation in RA patients classified according to both these new criteria and the ACR 1987criteria, suggesting both sets of criteria to reflect a comparable pathophysiological phenomenon.[(3.1)]
Raja et al. compared the performance of the new 2010 ACR/EULAR criteria with the 1987 criteria in an early arthritis cohort from NewZealand, suggesting that the 2010 ACR/EULAR criteria allow an earlier RA classification than the 1987 ACR criteria.[(3.2)]A Canadian study by Bykerk et al. describes the differences between the old and the new criteria .The 2010 RA classification criteria identify more patients with RA who would previously have been designated as having undifferentiated disease. [(3.3)]

Disease course in RA can be unpredictable and in many cases, particularly in patients with active disease, it progresses to develop cartilage destruction, joint damage and deformity over a period of time [(4-7).] Clinical disease progression in RA is usually monitored by standard clinical, laboratory and functional indices, whereas serial xrays of hands and feet assess structural damage [(4-7).] It has been demonstrated that progression of structural damage on x-rays leads to more functional disability, increased requirement for orthopaedic surgery and negative

impact on socioeconomic as well as other healthcare costs [8-12]. Therefore, the ultimate goal of treatment in RA is to suppress disease activity as low as possible in order to induce and maintain clinical remission and to reduce joint damage and deformity and thus a more favourable long-term outcome.

II. Aim And Objective

To study the clinical and the radiological profile of patients with SN and SP rheumatoid arthritis classified according to the EULAR criteria.

III. Review Of Literature

Rheumatoid factor and RA : Waaler's observation of high levels of serum RF inpatients with RA radically changed the earlier concepts of RA as a disease purely of abnormal connective tissue metabolism. Presence of IgM RF in RA is the sole serologic indicator included in the ARA disease criteria (Amett et al, 1988). Rheumatoid factor is detected in 75-80% of hospital treated RA patients. Rheumatoid factor is a consistent predictor of joint severity in RA (Bukhari M, 2002). Bukhari identified 12 studies that demonstrated that RF was associated with worsening of rheumatoid joint disease. Rheumatoid factors are antibodies directed against gammaglobulins. The most common RF is an IgM antibody to IgG. Polyclonal IgM of the sera of patients with RA react with a diverse array of antigenic determinants localised to the Fc portion of the IgG molecule in both the CH2 and CH3 domains (Johnson et al 1976). The synovial fluid of RA patients unlike the serum frequently has markedly depressed complement levels and contains high molecular weight IgG aggregates (Hannestad K, 1967; Winchester, 1970). IgM RF can fix complement (Tanimoto 1975). This process is important in RA and induces inflammation of the synovium.

Anti- CCP antibody in RA : Anti-CCP belongs to the family of antifilaggrinautoantibodies, accompanied by the antikeratin antibody and the antiperinuclear factor. A commercial enzyme immunoassay (EIA), containing a synthetic citrullinated peptide, has been developed for detecting anti-CCP antibodies. It has been reported to be as specific 90–99% but more sensitive 66–88% for RA. The extreme diagnostic specificity of anti-CCP for RA raises the question of an aetiopathogenetic connection. Comparisons of the prognostic value of RF and anti-CCP measured as radiological progression have shown varying results. Little has been done to study the relation of anti-CCP antibody positivity and the clinical disease course over time in early RA. Neither have, to the best of our knowledge, follow up results on anti-CCP antibodies for "seroconversion" or changing serum levels been published. The presence of anti-CCP is also a prognostic marker and is
associated with more aggressive disease, preceding the clinical manifestations of RA by up to 10 years along with RF ([79-81)

CRP and ESR : CRP is a member of the pentraxin family, a pattern recognitionprotein and a host-defense-related component of the innate immune system [40,42].
CRP is a sensitive marker of systemic inflammation, and the plasma concentration levels are elevated in RA patients and in other conditions with both acute and chronic inflammation [43-45]. Although CRP is a non-specific test, doctors may utilize the test to assist the effectiveness of a specific arthritis treatment and to monitor periods of disease flare-up. ESR measures how fast red blood cells fall through a column of blood. It is an indirect index of acute-phase protein concentrations (particularly fibrinogen) and is a sensitive but non-specific test used to assist in the detection of inflammation associated with auto immune diseases, infections and cancers [46].

Assessment of Disease Activity In RA : Measurement of disease activity atspecific time points or at regular intervals helps to evaluate disease progression and it is vital to assess treatment response, outcomes and prognostic factors. These methods have been designed and modified to evaluate three different but interrelated aspects of the disease progression: clinical, radiological and functional.

Assessment of clinical disease activity : In 1981, the American RheumatismAssociation (ARA) developed preliminary clinical criteria for remission and both the original and modified versions of these criteria were used in several studies.

Preliminary ARA remission criteria

1. No joint pain
2. No fatigue
3. Early morning stiffness
4. No joint swelling
5. No joint tenderness or pain on motion
6. Normal ESR of <30 in women and <20 in men

This has been modified later by omitting fatigue and by making the assessment at one study point rather

than two times, to make it more disease specific and more practical to use.

Modified ARA remission criteria omits fatigue and patient is said to be in remission when he satisfies all the 5 points.In the early 1990s, core sets of disease activity measures were proposed by the American College of Rheumatology (ACR, formerly ARA), European League against Rheumatism (EULAR) and World Health Organization (WHO) / International League of Associations for Rheumatology (ILR), to standardize disease activity assessments in the clinical trials involving RA patients [47-50]. These measures included swollen joint count (SJC), tender joint count (TJC), patient assessment of pain, global assessment of disease activity by the patient (PGA) and by the evaluator (EGA) and acute phase reactants such as ESR & CRP. The core set also included structural damage on radiographs and functional status and thesemeasures were identified on the basis of available evidence, consensus by expert committees and most importantly because of their ability to predict outcome [50,51].

Swollen and tender joint counts : Joint involvement or inflammation in RA hastraditionally been assessed using swollen (soft tissue swelling and effusion) and tender joint counts (tenderness on pressure or motion). Methods, to includedeformed joints in the assessment have also been suggested but not used routinely [52,53].Some of these methods weight joints by surface area (weighted joint counts),

whereas others weight joints by severity of swelling and tenderness (graded joint counts) [51]. The joint indices that were introduced earlier involved extensive number of joint counts and grading of swelling and tenderness, which were time consuming and led to inter-observer disagreement [54-58]. Ritchie et al, introduced a graded tender joint count, assessing 26 joint areas with grades ranging between 0 to 3 depending upon the severity of joint tenderness [57]). Hart and colleagues modified this later to exclude grading by severity, which was the main reason for disagreement between observers [55]. Further modifications of the joint indices and simplifications of the extensive joint counts were carried out by other groups over the years, reducing the number of 46 joints assessed [59-61]. These simplified joint counts have been validated and are reliable and easy to use in clinical practice [62-64).

Pain : Pain is the main symptom for majority of patients with RA andit is usually measured on a 100-mm visual analogue scale (VAS), evaluating symptom for one week before the study point. Horizontal VAS is more commonly used than vertical scales and there are also other reliable methods of pain assessment such as, arthritis impact measurement scale (AIMS) and McGill pain questionnaire [51].

Global assessment of disease activity : Both patients and evaluatorsassess overall disease activity on a 100-mm VAS. Patient global assessment of disease activity (PGA) is a subjective measure and it is different from the patient assessment of global health (GH) as in the latter, all possible domains of health outcomes, including those that are directly or indirectly related to the disease process are included. On the other hand, evaluator global assessment of diseaseactivity (EGA) is usually based on subjective and objective measures that is available to the evaluator [51].

Disease activity scores and indices : Composite disease activityscores have been developed over the years to overcome problems and these scores use special formulas integrating SJC, TJC, ESR or CRP and GH to measure overall disease activity [51]. Van der Heijde et al, introduced disease activity score (DAS) in 1990 with a view to help physicians grade the level of disease activity and to assess treatment response. The original DAS is based on Ritchie articular index (RAI) and 44-swollen joint count and it employs a complex formula, using square root and logarithmic transformation of variables and different weights for each variable [65,66]. This was later modified to include the reduced 28-joint count, DAS28, which

shows similar validity and reliability compared to DAS and has been widely used [84;63.64]). Both DAS and DAS28 have been modified in several ways to exclude theassessment of GH (DAS-3 and DAS28-3) and to include CRP instead of ESR (DAS-CRP and DAS28-CRP) [66]

Formulae to calculate DAS with 4 or 3 variables and with ESR or CRP

DAS = 0.54 x √(Ritchie) + 0.065 x SJC44 + 0.33 x lognat(ESR) + 0.0072 x GH DAS-CRP = 0.54 x √(Ritchie) + 0.065 x SJC44 + 0.17 x lognat(CRP+1) + 0.0072 x GH + 0.45 DAS-3 = 0.54 x √(Ritchie) + 0.065 x SJC44 + 0.33 x lognat(ESR) + 0.224 DAS-3 CRP = 0.54 x √(Ritchie) + 0.065 x SJC44 + 0.17 x lognat(CRP+1) + 0.65

Formulae to calculate DAS28 with 4 or 3 variables and with ESR orCRP

DAS28 = 0.56 x √(TJC28) + 0.28 x √(SJC28) + 0.70 x lognat(ESR) + 0.014 x GH DAS28-CRP = 0.56 x √(TJC28) + 0.28 x √(SJC28) + 0.36 x lognat(CRP+1) + 0.014 x GH + 0.96 DAS28 -3 = [0.56 x √(TJC28) + 0.28 x √(SJC28) + 0.70 x lognat(ESR)] x 1.08 + 0.16 49 DAS28 -3 CRP = [0.56 x √(TJC28) + 0.28 x √(SJC28) + 0.36 x lognat(CRP+1) x 1.10 + 1.15

Because of the complexities of the above formulae, which require calculator or computer program, simpler joint indices, based on ACR and EULAR core sets, have been developed. One of them is the simplified

disease activity index (SDAI), which is based on SJC, TJC, PGA, EGA and CRP and it has been used in several studies as well as routine clinical practice [(56).]
SDAI = SJC28 + TJC28 + PGA + EGA + CRP

The SDAI has been later modified by omitting CRP to help physicians calculate disease activity and make treatment decisions at the time of clinical assessmentitself without having to wait for CRP, termed clinical disease activity index (CDAI) [(56).]
CDAI = SJC28 + TJC28 + PGA + EGA

Clinical Disease Activity Index (CDAI) is a composite index (without acute-phase reactant) for assessing disease activity. CDAI is based on the simple summation of the count of swollen/tender joint count of 28 joints along with patient and physician global assessment on VAS (0–10 cm) Scale for estimating disease activity . The CDAI has range from 0 to 76. The greater advantage associated with CDAI is its potential to be employed in evaluation of patients with RA consistently with close frequency and independently of any calculating device, therefore, it can essentially be used everywhere and anytime for disease activity assessment in RA patients. Also, CDAI cutoff values for remission are more stringent than DAS-28, since CDAI allows for lesser residual disease activity because DAS-28 < 2.4 allows up to 8 tender/swollen joint count while CDAI < 2.8 allows only less than 2 tender/ swollen joint count.

Based on the above discussion, it was worthwhile to calculate the CDAI in Indian RA patients and assess its correlation to DAS-28, as there is a limited experience with CDAI in Indian setting. [(92] Clinical Disease Activity Index (CDAI) of the patients at the same visit was performed by the following formula:
CDAI = TJC + SJC + PDGA + EDGA,

Assessment of radiological progression : Conventional radiography has been traditionally used to assess structural damage in RA. X-rays of hands and feet and/or large joints have been used to define radiological damage at a given time point as well as progression of structural damage over a period of time. It has been widely recognized that radiological damage on x-rays has to be quantified to define the disease status of the patient and more importantly to assess disease progression, treatment response and outcome (67). As there are no truly quantitative methods, semi-quantitative methods have been developed to translate the amount of structural damage on x-rays into a score value (67). There have been several to answer some important questions such as, which abnormalities should be included, which joints should be scored, which views, which order the films should be read and which scoring system to use (68.69)

Standard **views of radiographs** The technical quality of theradiographs is important for accurate assessment of structural damage, particularly in studies using radiographic outcome as a primary objective. Other factors such as, good positioning of the hands and feet and proper exposure of the film is also essential in obtaining accurate information. Posteroanterior (PA) view of the hands and feet x-rays is the most commonly used technique, although other views such as, Norgaard view (a 45^0 supine view with straight finger) and Brewerton view (a tangential view with the MCP joints flexed at 65^o and with a 15^o volar beam) have been used without any significant advantage [(69).]

Scoring method Larsen developed a global scoring method in 1974,based on a set of standard radiographs. In this method, both hands and feet were included and erosions and joint space narrowing were scored together. The original Larsen method was modified several times in the following years both by Larsen and by other groups [(70-72)]. The number of joint areas assessed and the grading of radiographic abnormalities vary between the original and modified methods and so the total score range was also different between them. Scoring details of Larsen method, that was used in this thesis is described here [(72)].

Following joints are assessed in this modified Larsen method:
Proximal interphalangeal(PIP) joints of both hands - 8
Interphalangeal(IP) joints of both thumbs - 2
Metacarpophalangeal (MCP) joints of both hands – 10
Both wrists (score multiplied by 5) - 2
Metatarsophalangeal joints (MTP) of 2nd to 5 th toes on both sides – 8 Interphalangeal (IP) joint of big toes on both sides - 2

Grading of radiographic abnormalities in this modified Larsen method:
Grade 1: Normal finding
Grade 2: Soft tissue swelling, juxta-articular osteoporosis, possibly with slight narrowing of the joint space
Grade 3: Early but definite abnormality consisting of bone erosion and distinct narrowing of the joint space.
Grade 4: Medium destructive abnormality with marked narrowing of the joint space
Grade 5: Severe destructive abnormality. Only minor parts of the articular surfaces remain

Grade 6: Mutilating lesions

Del Val Del Amo, R. Ibanez Bosch, C. Fito Manteca et all from Spain analysed the value of anti-CCP in patients with RA as a prognostic factor, as well as its relationship with disease activity. A cross-sectional study was made ,which concluded Prevalence of anti-CCP was higher among patients with higher activity. Patients with higher levels of anti-CCP antibody had more aggressive disease, with greater activity (elevated values in DAS 28 and CRP) and more severe radiological damage (more erosions and higher radiological damage). [(73)]

Haroon N, Aggarwal A, Lawrence A, et all Conducted a study in 2007 at Lucknow, Uttar Pradesh, India on the impact of RA on quality of life and its relation with the severity. Quality of life was assessed using the World Health Organization Quality of Life assessment,(WHOQOL). Disease activity was assessed by the DAS28 for 3 variables and functional disability by the HAQ.Patients wih chonic RA ,SP subgroups had direct correlation with the high scores of DAS28, HAQ-DI and WHOQOL. [(74)]

Study by Vjollca Sahatçiu-Meka, Sylejman Rexhepi et all showed clinical manifestations like Diffuse lung fibrosis, central and peripheral nervous system injuries confirmed higher presence in SP patients as compared to the SN subgroup , and more radiological damage in early RA as compared to clinical and functional impairment.[(75)]

M van den Broek, L Dirven, NB Klarenbeek et all studied on thecinical response of monotherapy on SN and SP subgroups, stating that the Clinical response to treatment was similar in SN an SP subjects.However, more SP patients, especially those treated with initial monotherapy, had significant radiological damage progression which could not achieve an drug free remission whereas the functional disability was more with the SP groups.[(76)]

Rantapää-Dahlqvist Sde, Jong BA et all evaluated the prevalence and predictive value of anti-CCP antibodies in individuals with RA in a case-control study showing Anti-CCP antibody and RFs of all isotypes predated the onset of RA by several years. The presence of these autoantibodies predicted the development and progression of RA having direct proportion with its severity, with anti-CCP antibody having the highest predictive value. [(77)]

J Ronnelid, M Wick, J Lampa et all studied serum levels of anti-CCP up to 5 years' follow up of patients with early RA, and to relate serum levels to disease course and to treatments in clinical practice. It was retrospective clinical trial which showed that presence of anti-CCP at diagnosis predicts a less favourable disease course and greater radiological progression despite treatment. Taken together, these observations suggest that anti-CCP positive RA has a distinctively severe course as compared to its negative counterpart.[(78)]

Kumi Shidara,Eisuke Inoue,Daisuke Hoshi et all studied theclinical significance of anti-CCP in the long-term outcome of RA in a large observational cohort of RA patients (IORRA) .In their cross-sectional analysis, anti-CCP-positive patients (84.2%) had a significantly longer disease duration and higher disease activity as compared to anti-CCP-negative patients statistically. [(79)]

T Möttönen, et all studied the prognostic significance of clinical and genetic markers on the outcome of patients with recent-onset RA . In a retrospective analysis, High clinical disease activity at baseline and RF positivity are the best predictors of poor prognosis in early RA. [(80)]H. Guler,, B. Ozer, C. Ozer &A. Balci aimed to investigate the relationship between anti-CCP levels and bone mineral density (BMD), bone turnover, and radiographic damage in patients with RA. BMD was measured by dual-energy X-ray absorptiometry (DXA).They found that RA patients with higher levels of anti-CCP antibody had lower lumbar and femoral BMD. Anti-CCP levels

were also associated with radiographic damage. Therefore, they suggest that anti- CCP may be a determinant of bone loss in patients with RA.[(81)] O Meyer,C Labarre, M Dougados, et all studied the value of antibodies to citrullinated proteins/peptides for predicting joint outcomes in patients with recent onset RA. Antibodies to citrullinated proteins/peptides determined early in the course of RA are good predictors of radiographic joint damage and clinical deformitiy.[(82)]V P K Nell, P Machold, A Stamm et all studied the value of rheumatoid factor (RF), anti-CCP, and anti-RA33 autoantibodies for diagnosis of RA and prediction of outcome in patients with very early arthritis in a prospective inception cohort. They suggested that Stepwise autoantibody testing in early inflammatory joint disease, starting with RF, followed by anti-CCP (in patients with RF <50 U/ml), and finally anti-RA33, should be used as a sensitive and effective strategy for distinguishing patients with RA at high risk for poor outcome[(83)]

Kroot EJ, de Jong BA, van Leeuwen MA, Swinkels H et all studied the predictive value of anti-CCP in patients with recent-onset RA. In almost 70% of RA patients, anti-CCP antibody is present at the early stages of disease. Anti-CCP-positive patients developed significantly more severe radiologicdamage and clinical as well as functional impairement than patients who were anti-CCP negative.[(84)]

Angela M. Incassati, David Fernandez et all in New York studied patients with SP and SN RA in a 2 years retrospective clinical trial which lead to a conclusion that SP subgroup of patients who exhibited severe clinical andfunctional impairment at the time of diagnosis and the SN group of patients had an equal or rather less impairment.[(85)]

Masi AT, Maldonado-Cocco JA, Kaplan SB et all studied the early course of newly diagnosed RA among young adult patients (16-44 yr). They found RF positive patients differed only in few articular manifestations from RF negative patients, but had a higher frequency of positive ANA at entry and more subcutaneous nodules and bone erosions during follow-up.
(86)

IV. Material And Methods

Study design:

This is a analytical observational study where we proposed to analyse the clinical features in respect to the work disability and functional impairment as well as the radiological progression /damage in two groups of seronegative and the seropositive subjects

Inclusion criteria :

A) Age from 18 to 80 years
B) Patients diagnosed with RA according to the EULAR criteria.
C) All diagnosed cases of RA under treatment or not underreatment who have come to follow-up.

Exclusion criteria :

A) All cases of other musculoskeletal disease and arthitidis.
B) Patients with acute underlying disorders.
C) all cases of joint pain that reduced or vanished with or without treatment in less than 6 weeks of presentation.
D) Patients with joint trauma of any kind
E) Patients with malignancy
F) Overlap syndromes and mixed connective tissue disorders.

V. Results And Discussion

Table no 3 :

Gender				
	SN	SP	Total	P value
Male	43(51.1%)	8 (9.5%)	51 (30.35%)	
Female	41(48.8%)	76(90.47%)	117(69.6%)	
Total	84(100%)	84(100%)	168(100%)	Significant

Total number of 168 patients were enrolled, 51 were males (30.4%) and 117 were females (69.6%) in which SN males were 43(1.1%) and SN females were 41(48.8%)Females were more in number, 76 (90.47%) as compared to 8(9.5%) males. This difference was found to be statistically significant with a significant P value. In our study females outnumbered males in rheumatoid disease and SP rheumatoid disease as well. It was found that females were 2.85 times more than males.Kvien TK, Uhlig T, Ødegård S, Heiberg MS, in Epidemiological aspects of RA quoted that RA is more frequent in females than males. They foundthat the prevalence of RA is 4-5 times higher in females than males, the result of which is same as that with our study.(15)

Yash Paul Dev, Nitin Khuller, Patthi Basavaraj, and Suresh G studied a total of 1520 individuals residents of Baddi industrial estate in Himachal Pradesh, India for the prevalence of RA .The odds of RA in females were nearlythree times higher than those in males, which was also statistically significant and also same as our study. ($p<0.005$) (17)

Ranwa BL, Gauri LA, Singh Sakshi, et all studied the prevalence of RA in Bikaner subgroup of population which had 356 patients enrolled out of which 103 were males whereas 252 were females . This tells that femalesconstituted almost 2.5-4 times more disease prevalence than males in india which gives the same result as our study.(16)

Chopra A, Patil J, Billempelly V, et all in a cross-sectional survey of the village showed a dominant distribution of 'pain at all sites (articular/soft tissues) in the females; painful neck (9.5%), back (17.3%), and calf (8.5%)appeared significant when compared to the Bhigwan males which is consistant with our study.(16)

Maria do Socorro, Teixeira Moreira , Almeida et all studied the age and gender of patients with RA observing higher female preponderance and illiteracy rate, in addition to a moderately severe erosivedisease on an average, as compared to males which is identical to the findings of our study.(87)

The findings of our study correspond well to the above mentioned five studies done earlier regarding the

observations of higher female prevalence in rheumatoid arthritis.

Table no 4 : Distribution of patients according to Age-Group

Age-Group	SN		SP		Total	
	No	Percentage	No	Percentage	No	Percentage
30	03	3.57%	00	00	03	1.79%
31-40	12	14.29%	03	3.57%	15	8.93%
41-50	14	16.67%	19	22.62%	33	19.64%
51-60	18	21.43%	24	28.57%	42	25.0%
61-70	32	38.09%	25	29.76%	57	33.93%
71-80	04	4.76%	10	11.90%	14	8.33%
>80	01	1.19%	03	3.57%	04	2.38%
Total	84	100%	84	100%	168	100%
Mean±SD	55.31±12.97		59.26±12.13			

Table no 4 : Age distribution in patients with RA.

Our study included patients of rheumatoid arthritis between the age of 18 to 80 year in which the mean age was found to be 61-70 years in both SN and SP groups.In the group of SN subjects which had 84 patients only 3 patients were found to be under 30 years old age group, 12 patients (14.29%) from 31 to 40 years, 14 patients (16.6%) from 41 to 50 years, 18 patients (21.43%) from 51 to 60 years , 32 patients (38.09%) from 61 to 70 years, 4 patients (4.76%) from 71 to 80 years and only 1 patient was more than 80 years old, whereas in the SP subjects there were 3 patients (3.57%) from 31 to 40 years, 19 patients (22.62%) from 41 to 50 years, 24 patients (28.57%) from 51 to 60 years, 25 patients (29.76%) from 61 to 70 years, 10 patients (11.90%) from 71 to 80 years and 3 patients (1.19%) were more than 80 years old.

The maximum age group in the SN subjects were found to be 61-70 years constituting 32 patients (38.09%), whereas for the SP group it was 61 to 70 years constituting 25 patients (28.57%), and 51-60 age group constituting 24 patients (28.57%). The mean age for the RA patients was 61-70 years, with SP subgroup having a wide range of symptoms of RA from 51 to 70 years.Kvien TK, Uhlig T, Ødegård S, Heiberg MS, in Epidemiological aspects of RA found that the prevalence of RA was lower below the age of 50, but above 60-70 years the female/male ratio was about twice thanthat of below 50 years which is statistically comparable and identical as our study.[88]

Yash Paul Dev, Nitin Khuller, et all studied individuals of 30-70 years age group and residents of Baddi industrial estate in Himachal Pradesh, India, finding subjects aged above 50 years (3.5%) showed a significantly higher prevalence of RA as compared to the others which shows a result that matches with our study. [17]

b Comparison of Mean EULAR Score in SP and SN patients:

	Mean ± SD	t-value	P-value
SN	6.59±0.696	5.54	P<0.0001
SP	7.35±1.048		Significant

Table no 5 : The mean EULAR scoring for the SP subjects was found to be 7.35 with a (t- value of 5.54 and P-value significant), where as for the SN subjects it was 6.59 with a (t value of 5.54 and P-value of P<0.0001s) which showed that EULAR score was found to be higher in the patients with positive serology for RA as compared with those with the SN patients and this difference was found to be statistically significant indicating that the SP subgroup with more mean EULAR score had a greater tendency of physical impairment than their negative counterpart.

Luliia Biliavska,Tanja A, Stamm Jose, Martinez-Avila et all studied Among non-RA with a score ≥6 patients, 91% had polyarticular disease with either abnormal levels of acute phase reactants (68.2%) or longer symptom duration. The majority of these individuals had chronic osteoarthritis concluding that EULAR score has a high predictive value for the sero prognostication of RA which is statistically comparable with our study. [89]

J. Kaufmann, S. Seel, A.E. Roske studied the relation of EULAR criteria in the disease prognosis and the functional/physical/radiological progression of the disease process. All the patients were observed for disease progression . The patients having EULAR score of more than 6 were found to have moderate to severe disease activity (DAS28 and DAS) as compared to others showing a similar correlation with our results. [91]

Table 6: Comparison of Mean Pain and Wellnes Scale in SP and SN patients:

		Mean ± SD	t-value	P-value
Pain Scale	SN	36.11±21.70	9.72	P<0.0001
	SP	65.32±16.95		Significant

Wellness Scale	SN	62.97 ± 21.34	7.30	P < 0.0001 significant
	SP	40.42 ± 18.59		

Table no 6 : The mean Pain score for the SN subjects was 36.11±21.70 (t value9.72 and P significant) whereas for the SP subjects it was 65.32±16.95 indicating higher levels for positive serology patients. This difference was found to be statistically significant.Pain in RA is multifaceted and complex. Measuring instruments are inadequate. RA Pain Scale (RAPS) was designed to measure pain comprehensively but has been sparsely reported. RAPS contained 24 questions (numeric score, anchored at 0 (never) and 6 (always); range 0–100). Fair tomodest correlation ($p < 0.05$) was seen with swollen joint count (0.16), Indian health assessment questionnaire (0.23), medical outcome short form (SF), 36 physical score (-0.35), SF 36 mental score (-0.21) and C-reactive protein (0.25), not with pain VAS. The standardized response mean (0.6) was equal to pain VAS and DAS 28. It found to be a valid and clinically relevant instrument for measuringpain in Indian patients suffering from RA which is same as the findings in our study.[92]

Anderson DL conducted a Psychometric evaluation of RAPS following estimation of content validity and a pilot study.The study's findings provided support for RAPS as a reliable and valid measurement of RA pain. Assessment of RA pain and its relationship to serology and other assessments like DAS28, DAS, global functional assessment gave a good prognostic marker for disease process showing a consistant observation as with our study.[93]

Table 7 & 8 : Comparison of Mean HAQ-DI Score in SP and SN patients:

	Mean ± SD	t-value	P - value
SN	0.959 ± 0.451	15.30	P < 0.0001
SP	2.07 ± 0.491		Significant

HAQ-DI score	SN		SP		Total	
	No	Percentage	No	Percentage	No	Percentage
0 - 1	53	63.09%	01	1.19%	54	32.1%
>1 - <2	26	30.95%	38	45.23%	64	38.09%
>2 - <3	5	5.95%	45	53.57%	24	14.28%
Total	84	100%	84	100%	168	100%

Table no 7-8 : The mean HAQ-DI score in SP subjects was found to be 2.07 ± 0.491 with a P-value significant and in the SN subjects it was 0.959± 0.451. (Reference range of HAQ-DI score being 0 to 3)In SN subgroup maximum no of patients appeared to be in group 1 of HAQ-DI score ranging from 0 to 1 which constituted 53 patients forming 63.09% followed by group 2 of HAQ-DI score having 26 patients forming 30.95%, whereas in the SP subgroup maximum patients appeared to be in the group 3 of HAQ-DI score having 45 patients constituting 53.57% followed by group 2 having 38 patients constituting 45.23%. Here statistically significant association was found between HAQ-DI score classification and sero-outcome (greater in SP subgroup) with a significant P value.Keystone E, Freundlich B, Schiff M, Li J, Hooper M made a report of study suggesting patients with baseline severe disease had higher HAQ-DI responses than patients with moderate disease which is same as the findings of our study.[94]

J.Jäntti, K. Ahol, K. Kaarela and H. Kautiainen studied work disability and its association with the HAQ-DI index and the Larsen score of radiographic damage, which stated that Work disability due to RA was already 31% with a HAQ-DI score of 0.561 among patients of working age. It increased gradually and the cumulative rate reached 80% by the 20 yr check-up indicating a similar result as our study where raised HAQ-DI score forms a prognostic marker for disease severity.[95]

AHakkinen, H Kautiainen, P Hannonen, et all had studied the associations between individual subdimensions of HAQ-DI and clinical variables in patients with RA. A higher pain score and swollen joint count in the upper extremities, decreased grip strength, and limited motion of wrist, shoulder,and knee joints explained increased disability (higher total HAQ scores) which were found to be an indicator of moderate to severe disease activity.[96]

The above four studies state that the mean HAQ-DI score is higher with greater physical impairment which is consistant with our present study.

Table 9 : Comparison of Mean DAS28 Score in SP and SN patients:

	Mean ± SD	t - value	P - value
SN	3.18 ± 0.715	15.78	P < 0.0001
SP	5.05 ± 0.812		Significant

Table 10 Showing patients grouped according to DAS-28 cutoff values for staging of disease activity (ACR-2008) in SN and SP subjects.

DAS28 grade	DAS28 total score	SN group	SP group
Grade 1 (remission)	< 2 . 6	17 (20.23%)	0 (0%)
Grade 2(low disease activity	≤ 3 . 2	38 (45.23%)	1 (1.19%)
Grade 3(mod disease activity)	> 3.2 and ≤ 5 . 1	28 (33.33%)	58 (69.04%)
Grade 4(severe disease activity)	> 5 . 1	1 (1.19%)	25 (29.76%)

The mean DAS28 score in SP patients was higher as compared to SN patients.Table no 9: The mean score for DAS28 activity in SP subjects was found to be 5.05 ± 0.812 whereas for the SN subjects was 3.18 ± 0.715 with an significant P-value showing the increased severity of disease activity in SP patients.Table no 10: Shows patients grouped according to DAS-28 cut-off values for staging of disease activity (ACR-2008) in SN and SP subjects, there were 17 patients out of the 84 patients that were included in this study as SN subjects which forms 20.23% in the remission group (grade 1) having DAS28 score of < 2.6, 38 patients forming 45.23% in grade 2 DAS28 having low disease activity, 28 patients forming 33.33% in grade 2 DAS28 having moderate disease activity and 1 patients forming only 1.19% in grade 4 DAS28 having severe disease activity, whereas in the SP subgroup there were 0 patients in the grade 1 DAS28 group forming remission criteria , 1 patient in the grade 2 group of low disease activity DADS28 forming 1.19%, 58 patients in grade 3 having moderate disease activity forming 69.04% , and 25 patients in the grade 4 forming severe disease activity of DAS28 having 29.76% of the 84 patients.

The SN group had maximum patients group under the grade 2 with 38 patients (45.23%) followed by 28 patients (33.33%) in he grade 3, and SP subgroup had maximum patients in the grade 3 with 58 patients (69.04%) followed by grade 4 group with 25 patients (29.76%) . There was a statistically significant association between DAS28 score classification with the sero outcome with significant P value.G Wells, J-C Becker, J Teng, M Dougados, M Schiff, et all validated and compared the definition of DAS28 on CRP to the definition based on ESR. DAS28 (CRP) yielded a better EULAR response more often than the DAS28 (ESR), the validation profile was similar to the DAS28 (ESR), indicating that both measures are equally useful for assessing disease activity in patients with
$_{RA}$(97)

Keystone E, Freundlich B, Schiff M, Li J, Hooper M stated that Patients with moderate disease generally achieved better clinical outcomes than patients with severe disease, including significant differences in DAS28 remission, low disease activity, and HAQ < or =0.5 . Patients with baseline severe disease had higher ACR and DAS responses than patients with moderate disease having a statistical correlation with our study. [(96)]
In a Portuguese study, the 2010 criteria were tested in a cohort of 37 patients with very recent onset polyarthritis. During the follow-up, 57% of the patients evolved to RA. At the initial visit the DAS28 in the RA group was significantly higher than in the non-RA group diagnosed as per the revised 2010 ACR/EULAR criteria showing similar results as our study.[(3.4)]

The above studies show that disease activity score in the beginning or in the course of the disease are indicative of an underlying SP disease which can be moderate to severe. In other words SP disease has got a higher higher DAS28.

Table 11: Comparison of Mean CDAI Score in SP and SN patients:

	Mean±SD	t-value	P-value
SN	8 . 2 1 ± 5 . 2 6		P < 0 . 0 0 0 1
SP	3 0 . 4 6 ± 1 4 . 7 0	1 3 . 0 6	S i g n i f i c a n t

Table 12. Showing patients grouped according to CDAI cutoff values for staging of disease activity in SN and SP subjects .

CDAI grade	CDAI total scores	SN subgroups	SP subgroup
Grade 1 (remission)	< 2 . 8	1 5(17.85%)	0 (0%)
GrADE 2 (low disease activity)	<2.8 to <10	4 2(5 0 %)	1 (1.19%)

Grade 3 (mod. Disease activity)	>10 to <22	27(32.14%)	36 (42.85%)
Grade 4 (severe disease activity)	>22 to <76	0 (0 %)	52 (61.90%)

Table no 11 : The mean levels of CDAI score were 8.21 ± 5.26 for SN subjects and 30.46 ± 14.70 for SP patients showing higher disease activity in SP subgroup.

Table no 12 : Shows patients grouped according to CDAI cutoff values for staging of disease activity in SN subjects, out of the 84 patients included in this study,15 patients came into grade 1 of CDAI score (<2.8) remission criteria which forms 17.85% of the total, 42 patients forming 50% of the total fell into grade 2 (>2.8 to < 10) of CDAI score of low disease activity, 27 patients forming 32.14% fell into grade 3 (>10 to < 22) of CDAI score of moderate disease activity whereas 0 patients fell into grade 4 (>22 to < 76) of severe disease activity of CDAI score, whereas in SP subjects, out of the 84 patients included in this study,0 patients came into grade 1 of CDAI score (<2.8) remission criteria which forms 0% of the total, 1 patient forming 1.97% of the total fell into grade 2 (>2.8 to < 10) of CDAI score of low disease activity, 36 patients forming 42.8% fell into grade 3 (>10 to < 22) of CDAI score of moderate disease activity whereas 52 patients fell into grade 4 (>22 to < 76) of severe disease activity of CDAI score forming 61.9 % of the total.

Maximum patients in the SN group were observed in the grade 2 with 42 patients (50%) followed by grade 3 having 27 patients (32.14%) and in the SP subgroup maximum patients were observed in grade 4 with 52 patients (61.90%) followed by 36 patients in grade 3 (42.85%). There was statistically significant association between CDAI classification and sero-outcome with a significant P value.

Table 13: Distribution of patients according to Global Functional Status

Global Functional Status	SN		SP		Chi-square value	P - value
	No	Percentage	No	Percentage		
Grade 1	62	73.8%	0	0	157.44	P<0.0001 Significant
Grade 2	22	26.2%	3	3.6%		
Grade 3	0	0	30	35.7%		
Grade 4	0	0	51	60.7%		
Total	84	100%	84	100%		

Table no 13 : Out of the 84 patients categorized into SN subgroup, 62 patients were into class 1 of global functional assessment forming 73.8% whereas 22 patients fell in class 2 of the score forming 26.2 %. Class 3 and 4 had no patients in this groupOut of the 84 patients included in SP class, class 1 subgroup had no patients, 3 patients fell into the class 2 category which formed 3.6%, 30 patients fell into class 3 forming 35.7% and 51 patients fell into class 4 forming 60.7% of the total.Maximum patients from the SN subgroup were observed in the grade 1 of global functional assessment having 62 patients (73.8%) followed by 22 patients in grade 2 (26.2%). Whereas in the SP subgroup, maximum patiients were observed in the grade 4 with 51 patients constituting 60.7% followed by 30 patients in grade 3 constituting 35.7% . there was a statistically significant association between global functional assessment and the sero-outcome of the patiens with a significant P value.

Global functional status of the patients was assessed with the following grades
Class I/Grade 1: Completely able to perform usual activities of daily living (self-care, vocational, and avocational)
Class II: Able to perform usual self-care and vocational activities, but limited in avocational activities
Class III: Able to perform usual self-care activities, but limited in vocational and avocational activities
Class IV: Limited in ability to perform usual self-care, vocational, and avocational activities.

Marc C. Hochberg, Rowland W Chang, et al validated revised criteria for global functional status in RA . Properties of this classification schema were superior to those of the original Steinbrocker criteria. Mean Health Assessment Questionnaire scores were significantly (P C 0.0001) different between, and increased across, the 4 classes.[98]

L M A Jansen, D van Schaardenburg, I E van der Horst-Bruinsma, P D Bezemer,B A C Dijkmans studied disease parameters at the end of one year. Possible predictors of the HAQ at entry and after one year were analysed by logistic regression.133 patients were included in the study. The median duration of complaints was three months (range 0–35) and the median HAQ score at entry was 1.12 (range 0–3) which concludd that the global functional status at entry is a good predictor for functional status at one year. [99]
The above studies are indicative of a better functional status in SN cases whereas the SP cases had comparatively a poor global functional status assessment. The findings of our study go hand in hand with the above studies.

Table 14: Distribution of patients according to Grade of Radiology (Larsen's score)

Grade of Radiology	SN		SP		Chi-square value	P-value
	No	Percentage	No	Percentage		
Grade 1	35	41.7%	00	0 0		
Grade 2	33	39.3%	01	1.2%	153.07	P<0.0001
Grade 3	6	7.1%	01	1.2%		S
Grade 4	00	0 0	16	19.0%		
Grade 5	02	2.4%	40	47.6%		
Grade 6	00	0 0	26	31.0%		
Total	84	100%	84	100%		

The table shows the presence of more aggressive radiological disease in SP patients of RA as compared to a better radiological picture in SN cases.Table no 14 : Radiological disease progression (larsens grading) , in SN subjects , 35 patients had grade 1 changes forming 41.7 %, 33 patients had grade 2 changes foring 39.3 %, 6 patients had grade 3 changes foring 7.1%, grade 4 had zero patients, 2 patients had grade 4 changes forming 2.4%, and zero pateints showing grade 6 changes.In SP subgroup, zero patients had grade 1 changes , 1 patient had grade 2 changes forming 1.2 %, 1 patiet had grade 3 changes forming 1.2%, 16 patients had grade 4 changes foring 19.0%, 40 patients had grade 5 changes forming 47.60%, whereas 26 patients had grade 6 changes forming 31% f the total with a P<0.0001 .

Maximum patients in the SN subgroup were observed in the grade 1 of Larsen's score having 35 patients (41.7%) followed by 33 patients in the grade 2 of Larsen's score constituting 39.3%. whereas in the SP group, maximum patients were found in the grade 5 having 40 patients (47.6%) followed by 26 patients in grade 6 having 31.0%. A statistically significant correlation was found between Larsen's scoring of radiological disease/erosion and the sero-outcome of the RA patients with a chi square value of 153.07 with P<0.0001.

Kaarela K, Kautiainen H studied Continuous progression of radiological destruction in SP RA. [92] In 103 patients with recent (< 6 months) SP RA,radiographs were taken at the onset of the illness and at various durations upto 20 years, which concluded that SP RA is a chronic disease still leading to continuous progression of joint damage 20 years after onset as compared to the SN controls having a positive correlation with our study. [100]

J. Edelman, A. S. Russell studied on a hypothesis which suggested that a subpopulation of patients with RA, diagnosed on clinical, radiologic and pragmatic grounds, but with negative rheumatoid factor tests, represents a clinical entity quite distinct from that of seropositve RA. They studied 60 sequentially presenting patients, 30 of whom were selected because they were SN, and 30 selected because they were SP in regard to IGM rheumatoid factor. The only major differences detected between the two groups on 'blind' assessment were a greater tendency to deformity, a greater degree of erosion and the presence of subcutaneous nodules in the SP group which shows a same result as our study.
(101)

Annette H, Van deHelm, Van Mil Kirsten , N Verpoort, Ferdinand C Breedveld, René EM Toes and Tom WJ Huizings studied the difference between the radiological progression between SP and SN subsets. In a cohort of 454 incident patients with RA, 228 patients were anti-CCP-positive and 226 patients were anti-CCP-negative. The mean tender and swollen joint count for the different joints and radiographs at inclusion was similar. At follow-up, patients with anti-CCP antibodies had more swollen joints and more severe radiological destruction having the same outcomes as our study.[66]

H. Guler,, B. Ozer, C. Ozer &A. Balci aimed to investigate the relationship between anti-CCP levels and bone mineral density (BMD), bone turnover, and radiographic damage in patients with RA. BMD was measured by dual-energy X-ray absorptiometry (DXA). They found that RA patients with higher levels of anti-CCP antibody had lower lumbar and femoral BMD. Anti-CCP levels were also associated with radiographic damage. Therefore, they suggest that anti-CCP may be a determinant of bone loss in patients with RA.(81)

E Berglin, T Johansson, U Sundin, E Jidell et all evaluated the significance of antibodies against anti-CCP and

RFs, before the onset of RA and when presenting as early disease (baseline), for disease activity and progression. 93 of a cohort of 138 patients with early RA (<12 months of symptoms)were evaluated..It was found that Patients with anti-CCP antibodiesbefore disease onset had significantly higher Larsen score and radiological damage at baseline and after two years.[102]

VI. Summary

This present study was conducted at MGM's Medical College and Hospital, Aurangabad.The study design was a hospital based observational studyAll the patients who were more than 18 years to 80 years having Rheumatoid arthritis (RA) according to the EULAR criteria were enrolled in the study.This study was conducted to correlate the clinical and radiological changes between Seronegative and Seropositive rheumatoid arthritis diagnosed according to the EULAR criteria.Maximum patients were between 61 to 70 age group in the Seronegative group forming 38.07%, whereas in the Seropositive subjects it is 61 to 70 years forming 33.93% and also 51 to 60 years forming 25% of the total age group.Females formed the major group constituting 69.6 % as compared to 30.35% of males.

EULAR scores were greater in the Seropositive subjects (7.35±1.048) as compared to Seronegative subjects (6.59±0.696)

Pain scale was higher in the Seropositive subjects (65.32 ±16.95 with P<0.0001)

as compared to the Seronegative subjects (36.11 ±21.70)

Wellness scale was greater in the Seronegative subjects assessed by the examiner (62.97 ±21.34) as compared to the Seropositive subjects which was 40.42 ±18.59. Health assessment questionnaire (HAQ-DI) scores were greater in the Seropositive subjects 92.07 ±0.491) as compared to the Seronegative subgroups which is 0.959 ±0.451.

Disease activity index 28 (DAS28) score was higher in Seropositive subgroup (5.05±0.812) as compared to to Seronegative subgroup which was 3.18 ±0.715.Global functional assessment (GFS) was higher in the Seropositive subgroup where 51 patients out of 84 belonged to the grade 4 of GFS forming 60.7 % , whereas for the Seronegative subgroup 62 patients out of 84 belonged to the grade 1 of GFS forming 73.8% meaning a worse disease prognosis in SP patients. Larsen's radiological score was maximum in the Seropositive subgroup where 40 patients belonged to the grade 5 of Larsen's scoring forming 47.6%, whereas 35 patients from the Seronegative subgroup belonged to the grade 1 of Larsen's score forming 41.7% of the total meaning the presence of radiologically erosive and distructice disease in SP patients.

VII. Conclusion

In our study maximum patients belonged to the 60 to 70 age group that were diagnosed as RA, who were further classified as seronegative and seropositive subgroups.The seropositive subgroup showed more clinical disease and disability progression as compared to the seronegative subgroup when compared with the various disease activity indices and scoring systems for Rheumatoid arthritis at the given point of time.Similarly, radiological progression or erosions was seen to be more in the seropositive subgroup where maximum patients were grouped under the grade 5 class of Larsen's scoring system, whereas for the seronegative subgroup, maximum patients had progression only upto class 3 of larsen's indicating a more pronounced radiological damage in SP subgroup at the given point of time.Our study observations point to a greater clinical and radiological rheumatoid disease activity in cases which are seropositive as compared to the seronegative counterparts in the study when different appropriate scoring systems and scales were properly applied .The findings of our study are consistent with many relevant studies done in the past.

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