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Ultrasonographic Assessment of Disease Activity in Rheumatoid Arthritis Using the Eular-Omeract Scoring System and its Correlation with Clinical qnd Biochemical Parameters

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ABSTRACT

Introduction: Rheumatoid arthritis (RA) is a chronic systemic autoimmune inflammatory disorder characterized by persistent synovitis, progressive cartilage destruction, bone erosions, and joint deformities, resulting in significant morbidity and disability. Early detection of active synovial inflammation is crucial for preventing irreversible structural damage and optimizing treatment outcomes. Musculoskeletal ultrasound (MSUS), particularly grey-scale (GS) and power Doppler (PD) imaging, has emerged as a sensitive and reliable imaging modality for assessing disease activity. The EULAR-OMERACT scoring system provides a standardized method for evaluating synovial hypertrophy and vascularity. This study aimed to assess disease activity in rheumatoid arthritis using ultrasonographic EULAR-OMERACT scoring and correlate ultrasound findings with clinical and biochemical markers of disease activity.

Materials and Methods: This cross-sectional observational study was conducted over a period of two years in the Department of Radiodiagnosis, Sri Siddhartha Medical College, Tumkur, Karnataka. Thirty-five patients diagnosed with rheumatoid arthritis according to the 2010 American College of Rheumatology/European League Against Rheumatism criteria were included. Clinical assessment included evaluation of joint pain, swelling, tenderness, morning stiffness, deformity, and disease duration. Laboratory investigations included erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), rheumatoid factor (RF), and anti-cyclic citrullinated peptide (Anti-CCP) levels. Ultrasonographic examination of bilateral wrist, metacarpophalangeal (MCP), and proximal interphalangeal (PIP) joints was performed using a high-frequency linear transducer. Synovial hypertrophy and vascularity were graded according to the EULAR-OMERACT scoring system. Statistical analysis was performed using SPSS version 25.

Results: The study included 35 patients, comprising 26 females (74.3%) and 9 males (25.7%), with a mean age of 38.11 years. Joint pain was present in all patients, while morning stiffness, tenderness, and joint swelling were observed in 65.7%, 48.6%, and 45.7% of patients respectively. Grade II synovial hypertrophy was the most common ultrasonographic finding across evaluated joints. Power Doppler vascularity was detected in 80% of patients. Bone erosions, synovial effusion, and tenosynovitis were identified in 80%, 22.8%, and 14.2% of patients respectively. ESR and CRP demonstrated statistically significant positive correlations with increasing grades of synovial hypertrophy, vascularity, and EULAR-OMERACT scores ($p<0.05$). Anti-CCP levels showed significant association with synovial hypertrophy grades but did not demonstrate a statistically significant correlation with overall disease activity scores.

Conclusion: Musculoskeletal ultrasound using the EULAR-OMERACT scoring

system is a valuable, non-invasive, and sensitive tool for assessing disease activity in rheumatoid arthritis. Significant correlations between ultrasound findings and inflammatory markers such as ESR and CRP highlight its utility in disease monitoring and therapeutic decision-making.

Keywords: *Rheumatoid Arthritis; Musculoskeletal Ultrasound; Power Doppler; Synovial Hypertrophy; EULAR-OMERACT; Disease Activity Assessment.*

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic systemic autoimmune disease characterized by persistent inflammation of the synovial membrane, leading to progressive cartilage destruction, bone erosions, joint deformities, and functional disability. The disease affects approximately 0.5–1% of the global population and is associated with substantial socioeconomic burden due to chronic pain, impaired quality of life, and reduced productivity. Women are affected more frequently than men, with a female-to-male ratio of approximately 3:1, and the disease commonly presents during the third to fifth decades of life.

Early diagnosis and accurate assessment of disease activity are fundamental to the successful management of rheumatoid arthritis. Modern treatment strategies emphasize early initiation of disease-modifying antirheumatic drugs (DMARDs) and biologic therapies to achieve remission or low disease activity. Consequently, reliable methods for evaluating inflammatory activity are essential for guiding treatment decisions and monitoring therapeutic response.

Clinical examination remains the cornerstone of disease assessment; however, it may underestimate ongoing synovial inflammation, particularly in patients with subclinical disease activity. Laboratory markers such as erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), rheumatoid factor (RF), and anti-cyclic citrullinated peptide (Anti-CCP) antibodies are routinely used to evaluate disease activity, but these markers may not accurately reflect the extent of synovial inflammation at the joint level.

Conventional radiography has traditionally been used to assess structural joint damage in rheumatoid arthritis. However, radiographs are relatively insensitive in detecting early inflammatory changes and may fail to identify active synovitis before irreversible joint destruction occurs. In recent years, musculoskeletal ultrasound (MSUS) has emerged as a valuable imaging modality because of its ability to provide real-time visualization of synovial hypertrophy, joint effusion, tenosynovitis, bone erosions, and synovial vascularity.

Grey-scale ultrasound allows detailed assessment of synovial hypertrophy and joint effusion, while power Doppler imaging enables visualization of active synovial vascularization, which is considered a direct indicator of ongoing inflammation. Several studies have demonstrated that power Doppler findings correlate closely with histopathological inflammation, disease activity indices, and future radiographic progression.

To improve standardization and reproducibility of ultrasound assessment, the European Alliance of Associations for Rheumatology (EULAR) and Outcome Measures in Rheumatology (OMERACT) developed a consensus-based scoring system for evaluating synovitis. The EULAR-OMERACT scoring system provides a semi-quantitative grading method for both synovial hypertrophy and power Doppler vascularity, facilitating objective assessment of disease severity and monitoring of treatment response.

Given the increasing role of musculoskeletal ultrasound in rheumatoid arthritis management, the present study was undertaken to evaluate synovial hypertrophy and vascularity using the EULAR-OMERACT scoring system and to determine the association between ultrasonographic findings and clinical as well as biochemical markers of disease activity in patients with rheumatoid arthritis.

MATERIALS AND METHODS

This cross-sectional observational study was conducted in the Department of Radiodiagnosis, Sri Siddhartha Medical College and Hospital, Tumkur, Karnataka, over a period of two years. The study included patients clinically diagnosed with rheumatoid arthritis (RA) who were referred from the Department of General Medicine and Rheumatology Clinic for radiological evaluation. Ethical Committee approval was obtained prior to commencement of the study (Approval Number: Awaiting).

A total of 35 patients fulfilling the 2010 American College of Rheumatology/European League Against Rheumatism (ACR/EULAR) classification criteria for rheumatoid arthritis were included in the study. Adult patients aged more than 18 years with a confirmed diagnosis of rheumatoid arthritis who provided informed written consent were enrolled.

Patients with a history of recent trauma involving the wrist or hand joints, previous surgical intervention for rheumatoid arthritis, or those unwilling to participate in the study were excluded.

Following enrolment, detailed demographic and clinical data were recorded using a standardized proforma. Clinical evaluation included assessment of joint pain, tenderness, swelling, morning stiffness, deformity, restriction of movements, disease duration, and Clinical Disease Activity Index (CDAI) wherever available. Relevant laboratory investigations including erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), rheumatoid factor (RF), and anti-cyclic citrullinated peptide (Anti-CCP) antibody levels were documented from patient records.

Conventional radiography of the affected wrist and hand joints was performed in two orthogonal projections. Additional radiographic views were obtained whenever clinically indicated for better assessment of joint involvement and erosive changes.

Ultrasonographic examination was performed using a high-frequency linear array/hockey-stick transducer with a frequency range of 8–18 MHz. Bilateral wrist joints, second to fifth metacarpophalangeal (MCP) joints, and second to fifth proximal interphalangeal (PIP) joints were systematically evaluated. Grey-scale ultrasound was used to assess synovial hypertrophy, joint effusion, tenosynovitis, and bone erosions. Power Doppler imaging was performed to evaluate synovial vascularity and active inflammation.

Synovial hypertrophy was graded according to the EULAR-OMERACT scoring system as follows:

• Grade 0: Normal synovium with no hypertrophy.

• Grade 1: Mild synovial hypertrophy characterized by a small hypoechoic or anechoic area beneath the joint capsule.

• Grade 2: Moderate synovial hypertrophy with elevation of the joint capsule parallel to the bone surface.

• Grade 3: Severe synovial hypertrophy with marked distension of the joint capsule.

Power Doppler vascularity within hypertrophied synovium was graded according to EULAR-OMERACT criteria as follows:

• Grade 0: No Doppler signal.

• Grade 1: Up to three isolated color signals or one confluent signal within the synovium.

• Grade 2: Doppler signals occupying less than 50% of the intra-articular area.

• Grade 3: Doppler signals occupying more than 50% of the intra-articular area.

Joint effusion, bone erosions, and tenosynovitis were recorded as either present or absent. EULAR-OMERACT composite scores were calculated for assessment of overall disease activity.

The collected data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 25. Quantitative variables were assessed for normality using the Kolmogorov-Smirnov test and expressed as mean ± standard deviation or median with interquartile range, as appropriate. Qualitative variables were expressed as frequencies and percentages.

Comparisons between groups were performed using Student's t-test, Mann–Whitney U test, one-way ANOVA, or Kruskal–Wallis test wherever applicable. Categorical variables were analyzed using Chi-square test or Fisher's exact test. Correlations between ultrasonographic scores and laboratory parameters including ESR, CRP, and Anti-CCP levels were evaluated using Spearman's correlation coefficient. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The present study included 35 patients diagnosed with rheumatoid arthritis according to the 2010 American College of Rheumatology/European League Against Rheumatism (ACR/EULAR) classification criteria. Among the study participants, 26 (74.3%) were females and 9 (25.7%) were males, with ages ranging from 19 to 60 years. The mean age of the study population was 38.11 years. Female predominance was observed, which is consistent with the known epidemiology of rheumatoid arthritis. (Table 1)

Table 1. Demographic Characteristics of Study Participants (n=35)

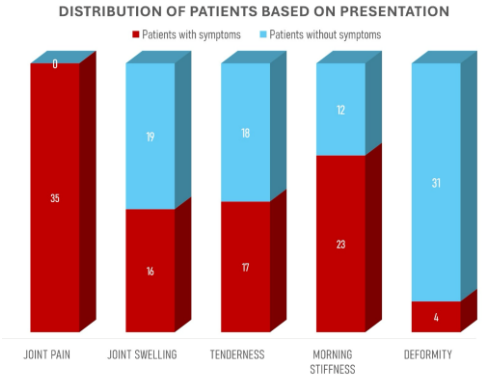
Variable	Category	Frequency (%)
Gender	Male	9 (25.7)
	Female	26 (74.3)
Age (years)	Range	19–60
	Mean Age	38.11 ± SD

All patients reported pain involving small joints of the hands and wrists. Morning stiffness was present in 23 (65.7%) patients, while tenderness and joint swelling were observed in 17 (48.6%) and 16 (45.7%) patients respectively. Joint deformity was identified in 4 (11.4%) patients. (Table 2)

Table 2. Clinical Presentation of Study Participants (n=35)

Clinical Feature	Frequency (%)
Joint Pain	35 (100)
Morning Stiffness	23 (65.7)
Tenderness	17 (48.6)
Joint Swelling	16 (45.7)
Deformity	4 (11.4)

Assessment of disease severity using the Clinical Disease Activity Index (CDAI) demonstrated varying grades of disease activity among the study population. Most patients belonged to the moderate disease activity category, indicating active disease despite ongoing treatment. Elevated ESR, CRP, and Anti-CCP levels were more commonly observed in patients with higher disease activity scores.



Ultrasonographic examination of bilateral wrist, metacarpophalangeal (MCP), and proximal interphalangeal (PIP) joints revealed varying degrees of synovial hypertrophy. Grade II synovial hypertrophy was the most common finding involving the wrist and MCP joints. The left wrist joint demonstrated grade II synovial hypertrophy in 16 (45.7%) patients. Grade II synovial hypertrophy was observed in 18 (51.4%) right MCP joints and 16 (45.7%) left MCP joints. (Table 3)

Table 3. Distribution of Synovial Hypertrophy Grades According to EULAR-OMERACT Scoring

Grade	Interpretation	Predominant Finding
Grade 0	Absent	Few patients
Grade I	Mild	Moderate frequency
Grade II	Moderate	Most common
Grade III	Severe	Least common

Power Doppler examination demonstrated vascularity within hypertrophied synovium in 28 (80%) patients, indicating active inflammatory disease. Grade 0 Doppler signal was the most common vascularity pattern in individual joints. Grade 0 vascularity was observed in 21 (60%) left wrist joints, 18 (51.4%) left MCP joints, and 15 (42.9%) right MCP joints. (Table 4)

JOINT	Synovial Hypertrophy Grade				Power Doppler Grade			
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 0	Grade 1	Grade 2	Grade 3
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Rt Wrist	13 (37.14%)	12 (34.29%)	10 (28.57%)	0 (0.00%)	20 (57.14%)	10 (28.57%)	5 (14.29%)	0 (0.00%)
Rt MCP	10 (28.57%)	5 (14.29%)	18 (51.43%)	2 (5.71%)	15 (42.86%)	14 (40.00%)	6 (17.14%)	0 (0.00%)
Rt PIP	19 (54.29%)	11 (31.43%)	4 (11.43%)	1 (2.86%)	29 (82.86%)	4 (11.43%)	1 (2.86%)	1 (2.86%)
Lt Wrist	15 (42.86%)	10 (28.57%)	16 (45.71%)	1 (2.86%)	21 (60.00%)	10 (28.57%)	4 (11.43%)	0 (0.00%)
Lt MCP	8 (22.86%)	10 (28.57%)	16 (45.71%)	1 (2.86%)	18 (51.43%)	15 (42.86%)	2 (5.71%)	0 (0.00%)
Lt PIP	20 (57.14%)	8 (22.86%)	7 (20.00%)	0 (0.00%)	30 (85.71%)	4 (11.43%)	1 (2.86%)	0 (0.00%)

Table 4. Distribution of Power Doppler Vascularity Grades

Vascularity Grade	Frequency (%)
Grade 0	Predominant finding
Grade I	Moderate frequency
Grade II	Less frequent
Grade III	Least frequent

Additional ultrasonographic abnormalities were identified during the study. Bone erosions were detected in 28 (80.0%) patients, making them the most common associated finding. Synovial effusion was observed in 8 (22.8%) patients, while tenosynovitis was identified in 5 (14.2%) patients. (Table 5)

Table 5. Additional Ultrasonographic Findings (n=35)

Finding	Frequency (%)
Bone Erosions	28 (80.0)
Synovial Effusion	8 (22.8)
Tenosynovitis	5 (14.2)

Evaluation of EULAR-OMERACT composite scores demonstrated that the majority of patients had mild-to-moderate disease activity. Seven (20%) patients demonstrated a score of 0, indicating remission and absence of active disease. Twenty (57.1%) patients had scores of 2 or less, suggesting controlled disease activity. Three (8.6%) patients demonstrated the highest disease activity scores, indicating severe active inflammation. (Table 6)

Table 6. Distribution of EULAR-OMERACT Disease Activity Scores

Score	Interpretation	Frequency (%)
0	Remission	7 (20.0)
1–2	Mild to Moderate Activity	20 (57.1)
3	Severe Disease Activity	3 (8.6)
Others	Remaining patients	5 (14.3)

Correlation analysis demonstrated a significant increase in ESR levels with increasing grades of synovial hypertrophy. Mean ESR values increased progressively from 3.50 in Grade 0 disease to 41.00 in Grade III disease. Similarly, ESR values demonstrated a marked increase with increasing EULAR-OMERACT scores, reaching a mean value of 115.00 in patients with the highest disease activity scores. The association between ESR and ultrasound disease activity was statistically significant ($p<0.05$). (Table 7)

Table 7. Correlation Between ESR and Ultrasound Disease Activity

Parameter	Mean ESR
Synovial Hypertrophy Grade 0	3.50
Grade I	16.00
Grade II	34.00
Grade III	41.00
p-value	<0.05

CRP levels also demonstrated a progressive increase with increasing disease severity. Mean CRP values increased from 8.00 in Grade 0 disease to 36.00 in Grade III synovial hypertrophy. Patients with higher EULAR-OMERACT scores demonstrated significantly elevated CRP levels, confirming the association between active synovitis and systemic inflammation. The correlation between CRP and ultrasound findings was statistically significant ($p<0.05$). (Table 8)

Table 8. Correlation Between CRP and Ultrasound Disease Activity

Parameter	Mean CRP
Synovial Hypertrophy Grade 0	8.00
Grade I	24.00
Grade II	23.00
Grade III	36.00
p-value	<0.05

Anti-CCP levels demonstrated increasing trends with higher grades of synovial hypertrophy. Mean Anti-CCP values increased from 14.00 in Grade 0 disease to 80.00 in Grade III disease. However, although Anti-CCP levels showed association with synovial hypertrophy grades, the correlation with overall EULAR-OMERACT scores did not achieve statistical significance ($p>0.05$).

Overall, ESR and CRP demonstrated significant positive associations with synovial hypertrophy grades, power Doppler vascularity grades, and EULAR-OMERACT composite scores. These findings indicate that musculoskeletal ultrasound findings closely correlate with inflammatory disease activity and can be effectively utilized in the assessment and monitoring of rheumatoid arthritis.

DISCUSSION

Rheumatoid arthritis (RA) is a chronic systemic autoimmune disease characterized by persistent synovial inflammation, progressive cartilage destruction, bone erosions, and eventual joint deformity. Accurate assessment of inflammatory activity is essential for early diagnosis, treatment planning, and monitoring therapeutic response. In recent years, musculoskeletal ultrasound (MSUS) has emerged as an important imaging modality owing to its ability to detect both structural and inflammatory changes at an early stage. The present study evaluated disease activity in rheumatoid arthritis patients using the EULAR-OMERACT ultrasonographic scoring system and correlated ultrasound findings with clinical and biochemical markers.

The demographic profile of the present study demonstrated a clear female predominance, with females accounting for 74.3% of cases. This observation is consistent with the established epidemiological pattern of rheumatoid arthritis, which predominantly affects women. Similar female predominance has been reported by Naredo et al., Wakefield et al., and Szkudlarek et al., who documented female-to-male ratios ranging from 2:1 to 4:1 in RA populations. The mean age of 38.11 years observed in the present study also corresponds with the typical age of disease onset reported in previous studies.

Clinically, joint pain was present in all patients, emphasizing its importance as the cardinal symptom of rheumatoid arthritis. Morning stiffness was reported by 65.7% of patients, while tenderness and swelling were observed in approximately half of the study population. These findings are comparable to those reported by Brown et al., who identified pain and morning stiffness as the most frequent presenting complaints in patients with active rheumatoid arthritis. The relatively lower frequency of deformities observed in the present study may be attributed to earlier diagnosis and initiation of treatment before the development of irreversible structural damage.

Ultrasound examination revealed that Grade II synovial hypertrophy was the most common finding across the evaluated wrist, MCP, and PIP joints. Synovial hypertrophy is a direct manifestation of synovial inflammation and represents one of the earliest pathological changes in rheumatoid arthritis. Similar observations have been reported by Szkudlarek et al., who demonstrated that grey-scale ultrasound is significantly more sensitive than clinical examination in detecting synovial thickening. The predominance of moderate-grade synovitis in the present study indicates that most patients had active but potentially controllable disease.

Power Doppler imaging demonstrated vascularity in 80% of patients, indicating active synovial inflammation. Power Doppler assessment has become increasingly important because it directly reflects synovial neovascularization, which is considered a marker of active inflammatory disease. Numerous studies have shown that Doppler activity correlates closely with histopathological findings of synovitis. Naredo et al. reported that Doppler-positive synovitis was associated with a higher risk of disease progression and radiographic deterioration. The high prevalence of Doppler activity observed in the present study further supports the usefulness of power Doppler imaging in evaluating disease activity.

Bone erosions were detected in 80% of patients, making them the most common additional ultrasonographic finding. Ultrasound has been shown to be considerably more sensitive than conventional radiography in detecting small cortical erosions, particularly in early disease. Wakefield et al. demonstrated that ultrasound could identify erosions before they become visible on plain radiographs, thereby facilitating earlier diagnosis and intervention. The high prevalence of

erosions observed in the present study may reflect prolonged disease duration in a subset of patients or delayed presentation to healthcare facilities.

Joint effusion and tenosynovitis were observed in 22.8% and 14.2% of patients, respectively. These findings are important because they represent additional manifestations of active inflammatory disease. Tenosynovitis, in particular, has been recognized as an early feature of rheumatoid arthritis and has been associated with future disease progression. Previous studies have reported similar frequencies of tenosynovitis in patients with established rheumatoid arthritis.

An important finding of the present study was the significant association between ultrasonographic findings and laboratory markers of inflammation. ESR demonstrated a progressive increase with increasing grades of synovial hypertrophy and vascularity. Patients with severe disease activity exhibited markedly elevated ESR values compared to those in remission or with mild disease. These findings suggest that ultrasound findings closely reflect systemic inflammatory activity.

Similarly, CRP levels demonstrated a statistically significant increase with higher grades of synovial hypertrophy, vascularity, and EULAR-OMERACT scores. CRP is widely recognized as an acute-phase reactant and is frequently used for monitoring disease activity in rheumatoid arthritis. The observed correlation between CRP levels and ultrasound scores supports the role of musculoskeletal ultrasound as an objective imaging biomarker of inflammatory activity. Comparable findings have been reported by Hammer et al., who demonstrated significant correlations between Doppler activity and inflammatory markers including CRP.

Anti-CCP antibody levels also increased with increasing grades of synovial hypertrophy. However, although Anti-CCP demonstrated association with synovial hypertrophy severity, it did not show statistically significant correlation with overall EULAR-OMERACT disease activity scores. This finding is not unexpected because Anti-CCP primarily reflects disease susceptibility and severity rather than current inflammatory activity. Previous studies have similarly demonstrated stronger associations between Anti-CCP positivity and structural joint damage than with short-term disease activity measures.

Evaluation of EULAR-OMERACT scores revealed that approximately one-fifth of patients were in remission, while the majority demonstrated mild-to-moderate disease activity. Only a small proportion exhibited severe disease activity. This distribution may reflect the beneficial effects of contemporary treatment strategies involving early diagnosis and aggressive disease-modifying therapy. Importantly, ultrasound was able to identify varying levels of inflammatory activity, including subclinical synovitis in some patients who might otherwise appear clinically stable.

One of the major strengths of the present study is the utilization of the EULAR-OMERACT scoring system, which provides standardized and reproducible assessment of synovial hypertrophy and Doppler activity. Standardization improves interobserver agreement and facilitates comparison of findings across different studies and institutions. Furthermore, assessment of multiple joints including wrists, MCP joints, and PIP joints enhanced the comprehensive evaluation of disease burden.

The study also highlights the complementary role of ultrasound alongside clinical examination and laboratory investigations. While clinical examination remains important, it may underestimate disease activity. Similarly, laboratory markers provide only indirect evidence of inflammation. Ultrasound bridges this gap by directly visualizing pathological changes within the joint and surrounding soft tissues. Consequently, it offers a more complete assessment of disease activity and may help guide treatment decisions.

The present study has certain limitations. The sample size was relatively small, comprising only 35 patients from a single tertiary care center. The cross-sectional design precluded longitudinal assessment of disease progression and treatment response. In addition, magnetic resonance imaging (MRI), which is considered another highly sensitive imaging modality for rheumatoid arthritis, was not used for comparison. Future studies involving larger patient populations and longitudinal follow-up may provide additional insights regarding the prognostic value of EULAR-OMERACT scoring.

Despite these limitations, the findings of the present study strongly support the role of musculoskeletal ultrasound in rheumatoid arthritis evaluation. Significant correlations between ultrasound findings and inflammatory markers indicate that ultrasound can serve as a reliable tool for disease activity assessment. The EULAR-OMERACT scoring system offers a practical and standardized method for quantifying synovial inflammation and monitoring treatment response in routine clinical practice.

Overall, the present study demonstrates that musculoskeletal ultrasound is a valuable adjunct to clinical and laboratory assessment in rheumatoid arthritis. The ability to detect synovial hypertrophy, Doppler vascularity, erosions,

tenosynovitis, and joint effusions provides comprehensive evaluation of disease activity and structural damage. Integration of ultrasound into routine rheumatologic practice may improve patient management, facilitate early therapeutic intervention, and ultimately contribute to better long-term outcomes.

CONCLUSION

The present study demonstrates that musculoskeletal ultrasound is a highly sensitive, reliable, and non-invasive imaging modality for assessing disease activity in patients with rheumatoid arthritis. Application of the EULAR-OMERACT scoring system enabled standardized evaluation of synovial hypertrophy and power Doppler vascularity, providing objective assessment of inflammatory activity across multiple joints.

The study revealed that Grade II synovial hypertrophy was the most common ultrasonographic finding, while power Doppler vascularity was detected in a significant proportion of patients, indicating active synovitis. Bone erosions, synovial effusions, and tenosynovitis were also effectively identified by ultrasound, highlighting its ability to detect both inflammatory and structural joint changes.

Significant positive correlations were observed between ultrasound scores and inflammatory markers such as ESR and CRP, confirming the utility of musculoskeletal ultrasound as an imaging biomarker of disease activity. Although Anti-CCP levels showed association with synovial hypertrophy severity, they did not demonstrate significant correlation with overall disease activity scores.

The findings of the present study support the integration of musculoskeletal ultrasound into routine clinical practice for diagnosis, disease activity assessment, therapeutic monitoring, and follow-up of rheumatoid arthritis patients. Early identification of active synovitis using ultrasound may facilitate timely treatment modifications, prevent irreversible joint damage, and improve long-term functional outcomes.

Future studies involving larger patient populations and longitudinal follow-up are recommended to further validate the prognostic value of EULAR-OMERACT scoring and establish its role in predicting treatment response and disease progression.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

ETHICAL APPROVAL

The study was conducted after obtaining approval from the Institutional Ethics Committee of Sri Siddhartha Medical College and Hospital, Tumkur, Karnataka.

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