

REVIEWER'S REPORT**Manuscript No.: IJAR-58101****Title: Carpal Tunnel Syndrome in Rheumatoid Arthritis: Performance Assessment of High Resolution Ultrasound and Electrophysiological Studies as A Diagnostic Tool,****Recommendation:****Accept after minor revision**

Rating	Excel.	Good	Fair	Poor
Originality			✓	
Techn. Quality		✓		
Clarity		✓		
Significance	✓			

Reviewer's ID: JPR-Bilqees Hamza***Detailed Reviewer's Report***

The manuscript addresses a clinically relevant and complex topic within the field of rheumatology and clinical neurophysiology, specifically focusing on the diagnostic performance and concordance of high-resolution musculoskeletal ultrasound and electrophysiological nerve conduction velocity studies in detecting Carpal Tunnel Syndrome among patients diagnosed with Rheumatoid Arthritis. This cross-sectional observational study evaluates a cohort of sixty adult patients recruited from the National Institute for Neuro-Motor System, leveraging the 2010 American College of Rheumatology/European League Against Rheumatism classification criteria for standardized patient inclusion. Given that median nerve compression represents a frequent extra-articular manifestation of chronic rheumatoid inflammation, the overarching objective of comparing non-invasive imaging modalities with standard electrodiagnostic parameters is highly commendable and carries practical utility for field clinicians.

The conceptual framework rests on a well-established pathological premise. The authors correctly highlight that the overlapping symptom profiles of active hand joint inflammation and median nerve entrapment complicate the accurate assessment of systemic disease activity. By evaluating the median nerve cross-sectional area and echogenicity alongside standard digital sensory and motor conduction velocities, the study attempts to unravel the diagnostic synergies necessary to distinguish localized

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neuropathy from systemic rheumatoid flares. The reported statistical significance regarding the agreement between nerve conduction studies and ultrasonographic grading offers encouraging evidence that high-resolution ultrasound can reliably echo physiological nerve degeneration. This finding is of great importance for expanding diagnostic access in clinical settings where comprehensive electrodiagnostic suites might be unavailable or poorly tolerated by highly sensitive arthritic patients.

Methodologically, the utilization of the Disease Activity Score in 28 joints serves as an appropriate clinical metric to categorize the cohort across varying stages of rheumatoid activity, ranging from clinical remission to high severity. The demographic composition, which skews heavily female, accurately mirrors established epidemiological data concerning the gender distribution of rheumatoid arthritis globally. Furthermore, the correlation discovered between prolonged disease duration and advanced nerve conduction velocity grading underscores the progressive, insidious nature of extra-articular peripheral nerve involvement in chronic, long-standing autoimmune diseases. The statistical presentation utilizing kappa coefficients effectively demonstrates a substantial strength of agreement between the two primary testing modalities, providing a solid mathematical foundation for the study's primary clinical conclusions.

However, despite these foundational strengths, the manuscript requires comprehensive structural, methodological, and contextual refinements before it satisfies the rigorous standards required for permanent archival publication. The current draft exhibits significant omissions regarding sample baseline detailing, critical contradictions within the data reporting tables, a superficial interpretation of the underlying pathomechanisms of nerve ischemia, and an inadequate critique of the inherent limitations associated with musculoskeletal sonography in the presence of severe joint deformity. Addressing these issues is vital to elevate the academic impact of the research and ensure its conclusions are fully defensible.

Areas for Improvement

The primary area requiring immediate rectifying action concerns the profound and explicit contradictions embedded between the narrative text and the corresponding statistical tables. In the narrative results section, the authors explicitly state that the mean morning stiffness duration was greatest in the moderate nerve conduction velocity severity group and similarly greatest in the moderate ultrasound severity group for both hands. However, a close inspection of the actual data values contained within the matching tables reveals that the analysis yielded non-significant differences across these categories. Specifically, the statistical significance testing for the right and left hands across both testing modalities shows values that vastly exceed the standard alpha threshold of five percent. This discrepancy represents a severe

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reporting error that compromises the scientific integrity of the results. The authors must thoroughly revise the narrative commentary to accurately reflect that morning stiffness duration did not differ significantly across the varying severity groups, rather than asserting a significant clinical association that the data openly denies.

Furthermore, the methodology lacks sufficient technical transparency regarding how the ultrasound measurements were operationalized. While the authors specify the use of a medical ultrasound system equipped with a high-resolution linear-array transducer, they omit the precise anatomical site where the median nerve cross-sectional area was captured. In patients suffering from advanced rheumatoid arthritis, the cross-sectional area can fluctuate dramatically depending on whether the measurement is taken at the radiocarpal joint space, the pisiform level, or the distal carpal tunnel outlet. The investigators must clarify their specific measurement protocol, including whether a continuous tracing method or an ellipse calculation tool was utilized to outline the nerve sheath. Defining these parameters is essential to ensure study reproducibility and to validate that the identified nerve hypertrophy was truly a product of compression at the carpal inlet rather than a localized artifact of regional tenosynovitis.

The discussion section also requires a significantly deeper theoretical expansion regarding the asymmetric findings observed between the right and left hands when correlating disease activity scores with nerve conduction values. The data indicates a statistically significant association between the disease activity metrics and nerve conduction abnormalities exclusively within the right hand, while the left hand failed to reach statistical significance. The current manuscript offers no clinical hypothesis or literature-based rationale to explain this discrepancy. The authors should incorporate contemporary literature regarding hand dominance, biomechanical stress factors, and asymmetric occupational usage patterns among rheumatoid patients. Exploring whether repetitive mechanical strain on the dominant right hand interacts synergistically with systemic inflammation to accelerate median nerve ischemia will transform a perplexing statistical anomaly into an insightful clinical discussion point.

Additionally, the manuscript treats the concept of median nerve ischemia in a highly superficial manner, attributes it primarily to mechanical vessel compression, and largely ignores alternative systemic pathways. In the introductory text, the authors briefly mention that rheumatoid neuropathy might encompass pharmacological toxicity, vasculitis, or amyloid accumulation, yet they fail to reintroduce or contextualize these secondary etiologies within their final discussion. Given that a quarter of the patient cohort demonstrated significant response distortion or atypical profiles, it is critical to address how underlying rheumatoid vasculitis or cumulative exposure to disease-modifying antirheumatic drugs might confound both electrophysiological responses and sonographic echogenicity. The discussion must be

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expanded to synthesize these overlapping pathophysiological mechanisms, thereby preventing an oversimplified interpretation of carpal tunnel syndrome as a purely mechanical entrapment phenomenon. Finally, the study completely overlooks the structural distortions introduced by advanced rheumatoid bone erosion as a primary confounding factor during musculoskeletal imaging. In severe, long-standing cases of rheumatoid arthritis, subluxation of the carpal bones and proliferative synovial pannus formation can physically displace the median nerve or compress the tunnel from the floor upward. The authors must explicitly insert a dedicated limitations section acknowledging that the diagnostic accuracy of high-resolution ultrasound may be significantly reduced in patients presenting with high disease activity or severe joint destruction. By addressing how structural wrist deformities impact the visibility and manual tracing of the median nerve boundaries, the authors will provide a more grounded, realistic perspective on the clinical utility of sonography in late-stage autoimmune cohorts.

Editorial Recommendation: Minor Revision

Following a rigorous, exhaustive peer review of the empirical structure, statistical tables, and narrative interpretations presented in this manuscript, the formal editorial recommendation is a **Minor Revision**. The core dataset possesses clear clinical value, and the study addresses a critical diagnostic challenge faced by rheumatologists and neurologists alike. The strong concordance observed between high-resolution musculoskeletal ultrasound and traditional nerve conduction velocity studies successfully reinforces the clinical utility of integrating affordable, non-invasive imaging workflows into routine rheumatological assessments.

The required revisions do not demand the recruitment of an expanded patient cohort or the execution of additional experimental procedures. Instead, they require the authors to meticulously audit their text to eliminate the glaring factual contradictions regarding morning stiffness metrics, clarify the exact anatomical tracing protocols used during sonographic execution, provide a robust theoretical explanation for the right-hand statistical asymmetry, and integrate a transparent discussion of the limitations imposed by rheumatoid bone erosions and systemic vasculitis. These enhancements are crucial for bringing the paper to a level of academic rigor suitable for international indexing.