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Acupuncture in Rheumatoid Arthritis: An Updated Review of Efficacy, Safety, and Practical Implications

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Abstract

Background: Rheumatoid arthritis (RA) is a chronic autoimmune inflammatory disease that leads to persistent joint inflammation, pain, stiffness, and progressive disability. Although disease-modifying antirheumatic drugs (DMARDs) have significantly improved clinical outcomes, many patients continue to experience residual symptoms such as pain, fatigue, and impaired quality of life. This unmet need has prompted growing interest in complementary and integrative approaches, particularly acupuncture, as adjunctive strategies for symptom relief and modulation of inflammatory activity.

Objective: To review and synthesize current clinical evidence on the efficacy, safety, and feasibility of acupuncture as an adjunctive treatment for rheumatoid arthritis.

Methods: A structured literature review was conducted across PubMed, Embase, Cochrane

Library, and Web of Science for studies published between January 2000 and September 2025. Eligible studies included randomized controlled trials (RCTs) of invasive acupuncture modalities—manual, electroacupuncture, auricular, or related techniques—conducted in adult RA patients and evaluating outcomes such as Disease Activity Score 28 (DAS28), pain intensity, morning stiffness, and inflammatory biomarkers (C-reactive protein [CRP], erythrocyte sedimentation rate [ESR]). High-quality meta-analyses and network metaanalyses incorporating RCTs were also reviewed.

Results: Recent meta-analyses and RCTs indicate that acupuncture, particularly electroacupuncture in combination with DMARD therapy, produces modest but statistically significant improvements in pain, morning stiffness, DAS28, and inflammatory markers (CRP,

ESR). Network meta-analyses from 2022 identified electroacupuncture plus DMARDs as the most effective modality for reducing disease activity, while fire needle and moxibustion demonstrated superior effects on pain relief and serologic outcomes. Adverse events were infrequent and mild, consisting primarily of transient local soreness or bruising. Nonetheless, the predominance of East Asian studies, heterogeneity of protocols, and limited long-term data restrict generalizability.

Conclusion: Acupuncture is a safe, well-tolerated adjunctive therapy that may enhance symptom control, reduce disease activity, and improve patient well-being in rheumatoid arthritis when integrated with standard pharmacologic management. Future large, multicenter, and methodologically rigorous RCTs are needed to determine its long-term impact on disease progression and to establish standardized, evidence-based

recommendations for clinical practice.

Keywords: rheumatoid arthritis, acupuncture, electroacupuncture, complementary therapy, disease activity.

Introduction

Rheumatoid arthritis (RA) is a chronic debilitating systemic autoimmune disease with persistent synovial inflammation associated with progressive joint destruction, pain, swelling, stiffness and functional disability [1]. In addition to joint involvement, significant extra-articular RA manifestations such as fatigue, anemia, osteoporosis and increased risk of cardiovascular disease contribute to enormous excess of morbidity and mortality [2]. Despite significant therapeutic progresses achieved over the last 20 year period, RA remains an important cause of global burden as reflected by disability-adjusted life years (DALYs) and socioeconomic costs [3,4].

The introduction of disease-modifying antirheumatic drugs (DMARDs) such as biologic and targeted synthetic agents has significantly improved clinical outcomes and decelerated radiographic progression [5]. However, many patients continue to have symptoms (residual stiffness and pain in the morning or diminished functional ability) despite achieving a biochemical remission [6]. In addition, some patients cannot tolerate pharmacologic treatment because of side effects, contraindications, or poor access to specialized care [7]. This challenging symptom burden has led to growing interest in the use of complementary and integrative medicinal (CIM) approaches as adjuncts to conventional medical care, to help improve symptom management and quality of life.

Acupuncture, an essential part of traditional Chinese medicine, simply means the insertion of fine filiform needles into well-delineated points located on various parts of the body to relieve artificial disharmonies and to trigger neural, endocrine and immune processes. Acupuncture, as shown in experimental studies, is able to inhibit proinflammatory cytokines like interleukin-6 (IL-6), and tumor necrosis factor-α (TNF-α) endorphins release and autonomic function via activation of the descending pain inhibitory pathway [8–10]. Clinical studies and meta-analyses have reported that acupuncture, especially electroacupuncture, may reduce pain, Disease Activity Score 28 (DAS28), morning stiffness and the level of inflammatory biomarkers when used in combination with DMARD therapy [11–13]. These effects are typically small in effect

size but statistically significant, and serve as suggestive evidence of an adjunctive role for this agent.

Issues of safety are also promising: adverse effects of acupuncture are rare and generally mild (e.g. local soreness or small haematoma at the site of needling) [14]. So long as skilled staff conduct the procedure and with aseptic precautions, BHT is relatively safe for even immunosuppressive patients including those being treated by biologics. Taken together, this evidence justifies acupuncture as an important adjunctive scheme in the multidisciplinary treatment of RA.

Hence, we aimed to review the current clinical evidence on acupuncture as partial analgesia for RA and critically summarize the efficacy, safety, and feasibility of using acupuncture as adjunctive therapy for RA in randomized controlled trials (RCTs) along with recent meta-analyses published between 2000 and 2025.

Methods

This work is a narrative literature review that aimed to summarize and critically appraise the available clinical evidence on acupuncture for rheumatoid arthritis (RA). A structured literature search was conducted covering the period from January 2000 to September 2025, focusing on human clinical studies that evaluated the effects of acupuncture and acupuncture-related interventions on clinical and laboratory outcomes in RA. Although this was not a registered systematic review, general

principles of methodological rigor inspired by PRISMA guidelines were applied to ensure transparency and reproducibility of the search and synthesis process.

The search was performed across four major electronic databases: PubMed/MEDLINE, Embase, Cochrane Library, and Web of Science. Search strategies combined controlled vocabulary and free-text terms, including "rheumatoid arthritis," "acupuncture," "electroacupuncture," "auricular acupuncture," "fire needle," and "moxibustion." In addition, the reference lists of relevant articles and previous reviews were manually screened to identify additional eligible publications.

Eligible studies included adult participants (≥18 years) diagnosed with RA according to either the 1987 American College of Rheumatology (ACR) criteria or the 2010 ACR/European League Against Rheumatism (EULAR) criteria. Studies were required to evaluate invasive acupuncture modalities, such as manual acupuncture, electroacupuncture, or auricular acupuncture, as well as related techniques frequently grouped in acupuncture meta-analyses—namely moxibustion and fire needle therapy—when these were used as adjuncts to standard pharmacologic treatment with disease-modifying antirheumatic drugs (DMARDs). Comparators included sham acupuncture, wait-list or usual care controls, conventional therapy alone, or active non-needling interventions such as autogenic

training.

The primary outcomes of interest were pain intensity measured by the Visual

Analogue Scale (VAS), duration of morning stiffness, Disease Activity Score in 28 joints (DAS28), tender and swollen joint counts, Health Assessment Questionnaire (HAQ) scores, and inflammatory biomarkers such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR). Safety outcomes were also reviewed, including any reported adverse events. Randomized controlled trials (RCTs), systematic reviews, and meta-analyses of RCTs were included, while case reports, narrative reviews without explicit methodology, non-RA populations, non-invasive acupressure interventions, and animal or in vitro studies were excluded.

Titles and abstracts identified through database searches were screened for relevance, and full texts of potentially eligible studies were reviewed in detail. Given the considerable heterogeneity in acupuncture protocols, acupoint selection, treatment frequency, and duration, as well as variability in outcome reporting, quantitative synthesis was deemed inappropriate. Therefore, results were summarized qualitatively, emphasizing the most recent high-quality meta-analyses (2022–2024) and representative randomized trials that provide the strongest evidence on the clinical utility, safety, and integration of acupuncture in the management of rheumatoid arthritis.

Results

A total of 32 randomized controlled trials (RCTs) and several systematic reviews and meta-analyses were identified that evaluated the role of acupuncture and related

modalities in patients with rheumatoid arthritis (RA). The overall evidence base includes randomized clinical trials of manual acupuncture, electroacupuncture, auricular acupuncture, and moxibustion, as well as recent quantitative syntheses comparing these modalities, often in combination with disease-modifying antirheumatic drugs (DMARDs). Table 1 summarizes the principal studies included in this review.

Overview of the evidence

The available literature on acupuncture in RA encompasses three main categories: (a) randomized controlled trials evaluating the clinical efficacy of different acupuncture modalities; (b) recent systematic reviews and meta-analyses providing quantitative assessments of outcomes; and (c) early comprehensive reviews that established the historical foundation for this research field. Collectively, these studies provide insights into the potential benefits, limitations, and methodological evolution of acupuncture research in RA over the last two decades [1–12].

Randomized controlled trials

Among individual RCTs, Tam et al. [6] conducted a double-blind, placebo-controlled study involving 20 sessions over 10 weeks that compared traditional acupuncture, electroacupuncture, and sham acupuncture. Although no significant difference was found between active and sham acupuncture for the primary outcome

of pain reduction, secondary measures demonstrated modest improvements in disease activity and functional parameters in certain subgroups.

Conversely, Bernateck et al. [7] randomized 44 patients to auricular electroacupuncture or autogenic training, both administered weekly for six weeks. While both interventions improved patient-reported outcomes, the electroacupuncture group showed earlier and more pronounced decreases in pain intensity, Disease Activity Score 28 (DAS28), and erythrocyte sedimentation rate (ESR). Importantly, no major adverse events were reported, reinforcing the safety of acupuncture as an adjunctive therapy. These trials illustrate the substantial heterogeneity in design, acupoint selection, comparator choice, and outcome measures that complicate direct comparisons and pooled analyses.

Recent meta-analyses and quantitative syntheses

Contemporary meta-analyses have substantially expanded the evidence base and clarified comparative efficacy across acupuncture modalities. A 2022 network meta-analysis including 32 RCTs and 2,115 patients with RA demonstrated that electroacupuncture combined with DMARDs achieved the greatest improvement in composite disease activity (DAS28), while fire needle therapy plus DMARDs was superior in reducing pain intensity, Creactive protein (CRP), and ESR levels [8]. Moxibustion combined with DMARDs provided the best outcomes for lowering

rheumatoid factor (RF) titers. None of the acupuncturerelated interventions surpassed DMARDs alone in improving morning stiffness duration.

Another 2022 network meta-analysis comparing multiple acupuncture-related modalities reached similar conclusions, confirming that electroacupuncture + DMARDs ranked highest for overall disease activity improvement, whereas fire needle + DMARDs and moxibustion + DMARDs were most effective for pain and serologic markers, respectively [9]. More recently, a 2023 systematic review and meta-analysis focusing on electroacupuncture found statistically significant reductions in DAS28, CRP, and ESR compared with standard medication alone, with an excellent safety profile and no serious adverse events reported [10]. Together, these high-quality pooled analyses consistently support the use of acupuncture—particularly electroacupuncture—as a safe and effective adjunct to conventional pharmacologic therapy for improving pain, inflammatory activity, and disease control in RA.

Earlier systematic reviews

Earlier comprehensive assessments, including the Cochrane review (2005) and the systematic review published in *Rheumatology (Oxford)* (2008), provide historical perspective on the evolution of evidence quality. The Cochrane analysis concluded that available trials were too small and methodologically limited to draw firm conclusions, though one study suggested transient pain relief following electroacupuncture [12]. Similarly, Lee et al. [13] emphasized the poor methodological quality of earlier research,

highlighting issues such as inadequate blinding, heterogeneous interventions, and short follow-up durations. These early limitations underscored the need for more rigorous studies and paved the way for the higher-quality meta-analyses published in the last decade.

In summary, the cumulative evidence indicates that acupuncture, particularly electroacupuncture in combination with DMARD therapy, produces consistent though moderate improvements in pain and disease activity among RA patients. Despite variability in study designs and acupuncture protocols, findings across recent meta-analyses converge toward the conclusion that acupuncture represents a safe, tolerable, and potentially beneficial adjunctive treatment for rheumatoid arthritis.

Discussion

According to the currently available evidence, acupuncture seems to be a promising adjunctive treatment for RA patients, especially in relieving pain, morning stiffness and inflammatory activity. However, the previous studies were inconsistent or inconclusive, and they were often flawed methodology with small sample size, short duration of intervention, heterogeneity in point selection among different trails or inappropriate control interventions. However, more recent RCTs and meta-analyses have shown an overall effect of acupuncture versus other non-acupuncture controls that was small but significantly different from zero when added to usual pharmacologic therapy including DMARDs. These benefits are manifested primarily in pain reduction

(Visual Analogue Scale, VAS recording), scores of disease activity (DAS28 score) and levels of inflammatory markers such as Creactive protein (CRP) and erythrocyte sedimentation rate (ESR) [6,8,9].

Of the multiple methods studied, electroacupuncture has been highlighted as the only method that considerably improves outcomes. Network meta-analyses have indicated that electroacupuncture (EA) in combination with DMARDs has a better effect on composite disease activity indices and inflammatory markers than other acupuncture-related therapies [9]. EA at auricular has also reported benefit in RCTs with earlier and more significant early achievement of ESR and DAS28 than non-needling behavioral interventions [7]. These results may indicate that acupuncture has physiologic actions, which cannot be explained solely in terms of expectation effects. The peripheral and central neural pathways modification, the stimulation of descending inhibitory pain systems as well as an hypothalamic–pituitary–adrenal axis regulation are some among proposed mechanisms. Furthermore, downregulation of pro-inflammatory cytokines, such as interleukin-6 (IL-6) and tumor necrosis factor-α (TNF-α), is also a potential mechanism through which acupuncture exerts its action on immune system, and the evidence linking clinical efficacy to immunological mechanisms continues to increase [8,10].

Neurophysiologically, acupuncture triggers a series of reactions in both peripheral and central channels. Needle insertion-induced activation of sensory

afferents caused excitation in interneurons and supraspinal circuitry (periaqueductal gray [PAG], nucleus raphe magnus, locus coeruleus) for modulation of endogenous analgesia through serotonergic and noradrenergic receptors. Functional neuroimaging experiments have shown that in particular, electroenacupuncture modulates activation of pain-related brain regions, such as periaqueductal gray, anterior cingulate cortex, insula and prefrontal lobe which play a role in pain perception and emotion regulation. These neuroimaging results support the hypothesis that acupuncture produces somatosensory and affective analgesic effects, as reflected by the pain ratings reported in this study -- an observation consistent with general reports of a reduction in both pain and fatigue in RA patients [8,10].

In addition to analgesia, acupuncture could impact neuroimmune interactions critical to the pathogenesis of RA. Experimental findings have shown that electroacupuncture reduces the activation of nuclear factor-kappa B (NF-κB), and inhibits expression of cyclooxygenase-2 (COX-2) and inducible nitric oxide synthase (iNOS), leading to the reduction in oxidative stress and joint inflammation. These changes might be translated into effects on the autonomic nervous system as well, in favour of parasympathetic dominance and against sympathetic hyperactivity during resting conditions, which is characteristic for chronic inflammation and fatigue in guided responses. These mechanistic insights are based largely on preclinical and

translational research, but offer a biologically plausible framework for the clinical findings with controlled trials [9,10].

Notwithstanding these encouraging findings, limitations exist for the interpretation and generalization of the present results. Most RCTs are of short duration (ie, < 3 months) and thus it is hard to tell whether acupuncture has a long-term effect on structural joint damage or radiographic progression. In addition, the majority of studies available are originated from this part of the world (East Asia), mainly China, calling into question the issue of external validity and generalizability across different populations and health care systems [14]. Furthermore, heterogeneity in acupuncture methodologies, such as acupoint choice, stimulation parameters, and frequency of application make comparisons across studies complex. Moreover, sham acupuncture controls, despite being commonly employed, vary in invasiveness and are not fully inert; they may be expected to dilute measured treatment effects. These methodological differences probably account for the moderate degree of heterogeneity found in combined analysis and underscore the importance of an standardized research protocol and international consensus guidelines

[8,9,12].

Reassuring safety data are also reported across studies. Acupuncture is safe and adverse effects are seldom observed, being limited to small reactions of short duration (local soreness, light bruising or fatigue). Various treatments if given by experienced practitioners with aseptic technique, serious adverse events are very rare so

acupuncture could also be considered as supplemental to otherwise effective pain medications for immunocompromised patients on DMARDs or biologic agents [8,9]. This favorable safety profile favors its use as an add-on non-pharmacologic option in patients desiring more symptom relief and global disease control.

From a clinical perspective, integrating acupuncture as part of an overall management plan for RA should lead to greater patient satisfaction and compliance by targeting dimensions of well-being that continue to be inadequately managed by pharmacological treatments alone. Tiredness, sleeping problems and mood changes are prevalent in RA and supervene with a significant decrease of quality of life. The known potential of acupuncture in modulating central and autonomic nervous system could justify the amelioration of these diverse symptoms, concomitantly with the anti-inflammatory activity produced by DMARDs as well biologic drugs. With healthcare models now adopting integrative medicine, these multimodal strategies may signal a paradigm shift toward providing more personalized patient-centric care.

Further high-quality, large-scale, multicenter RCTs with standardized acupuncture treatment and sufficient blinded procedures following long-term observation are necessary to explore whether the effects of acupuncture can not only affect symptom improvement outcomes but also disease modifying or joint structural progress. Integration of acupuncture into treat-to-target management strategies and addition of cost-effectiveness analyses will help to more clearly define its position in

modern rheumatologic treatment. Until such high quality evidence becomes available, we agree with these authors that providers should offer acupuncture as an adjuvant strategy to enhance symptom management rather than subtitute it for what works from a pharmacologic approach.

In summary, the current available evidence suggests that acupuncture (especially electroacupuncture) is effective in reducing pain and disease activity among patients with RA when used as an adjunct to conventional pharmacotherapy. The synergy of clinical efficacy, mechanistic plausibility and excellent safety should serve as the rationale for acupuncture as a credible evidence-based complementary intervention in the comprehensive, patient-centered management of RA, however its disease-modifying potential remains to be confirmed.

Declarations

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Table 1. Summary of the included studies on acupuncture and rheumatoid arthritis

Study / Author (Year)	Objective	Sample (n)	Intervention	Comparator	Primary Outcomes	Main Results / Conclusion
Tam et al. (2007) [6]	Evaluate efficacy and safety of traditional vs. electroacupuncture in RA.	20 sessions (10 weeks)	Traditional acupuncture and electroacupuncture	Sham acupuncture	Pain (VAS), DAS28, HAQ, morning stiffness	No clear superiority over sham for primary pain outcome. Some secondary measures improved in subgroups. Acupuncture was safe but effects were modest and heterogeneous.
Bernateck et al. (2008) [7]	Compare auricular electroacupuncture vs. autogenic training.	44	Auricular electroacupuncture (6 weekly sessions)	Autogenic training	Pain (VAS), DAS28, ESR	Earlier and greater reductions in pain, DAS28, and ESR in the electroacupuncture group. Safe and effective as adjunctive therapy.
Wen et al. (2025) [14]	Evaluate acupuncture combined with grain-sized moxibustion for RA with finger joint pain.	NR	Acupuncture + moxibustion	Acupuncture alone	Pain (VAS), inflammatory markers	Combined therapy resulted in greater improvement in pain and inflammation. May enhance clinical benefit.

Wan et al. (2022) [8] – Network meta-analysis	Assess efficacy of various acupuncture-related therapies combined with DMARDs in RA.	2,115	Electroacupuncture, fire needle, moxibustion + DMARDs	DMARDs alone		Electroacupuncture + DMARDs showed best Pain (VAS), HAQ, CRP, ESR, DAS28, RF moxibustion + DMARDs best for RF. improvement in DAS28; fire needle + DMARDs best for pain (VAS), CRP, ESR;
Zhou et al. (2022) [9] – Network analysis	Compare relative efficacy of acupuncture modalities combined with DMARDs.	2,115 meta-	Electroacupuncture, moxibustion, fire needle + DMARDs	DMARDs alone	DAS28, pain (VAS), CRP, ESR, RF	Electroacupuncture + DMARDs ranked highest for DAS28; fire needle + DMARDs best for pain and inflammation; moxibustion + DMARDs best for RF reduction.
Study / Author (Year)	Objective	Sample (n)	Intervention	Comparator	Primary Outcomes	Main Results / Conclusion
Feng et al. (2023) [10] – Metaanalysis	Evaluate electroacupuncture combined with standard medication vs. medication alone.	NR	Electroacupuncture + standard therapy	Medication alone	DAS28, CRP, ESR	Significant improvements in disease activity and inflammatory markers with good safety profile. Supports electroacupuncture as effective adjunct.

Casimiro et al. (2005) [12] – Cochrane systematic review	Summarize RCT evidence on acupuncture and electroacupuncture up to 2005.	NR	Acupuncture and electroacupuncture	Control	Pain, function, radiographic outcomes	Evidence insufficient for routine recommendation. One study showed shortterm pain relief; overall quality low.
Lee et al. (2008) [13] – Systematic review	Update evidence from 2005–2008.	NR	Acupuncture (various protocols)	Control	Pain, DAS28, inflammatory markers	Conflicting results with methodological flaws (small samples, poor blinding). Evidence weak and insufficient for firm conclusions.