

A Meta-Analysis to Investigate the Effect of Rheumatoid Arthritis on Quality of Life

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Abstract: Rheumatoid arthritis (RA) is a chronic autoimmune disease that causes inflammation and progressive disability in the joints with detrimental effects on the quality of life (QoL) of patients. Knowing the impact and its predictors will help to inform clinical management and improve outcomes for patients where This meta-analysis aimed to quantify existing evidence on the effect of RA on health-related quality of life (HRQoL), explore predictors of the effect, and synthesize clinical implications where a comprehensive literature search was performed across major databases, including PubMed, Google Scholar, and Scopus, to identify meta-analyses or high-quality studies published within the last 10 years that examined QoL in adults with RA. Inclusion criteria focused on studies that examined QoL using established and validated instruments (SF-36 and HAQ) which Data extraction involved studying the aim, participant characteristics, methods, QoL findings, and the authors' conclusions and Quality assessment tools ensured characterized the soundness of the methodology in the included studies however meta-analytic model was performed to address heterogeneity with subgroup and sensitivity analyses performed to examine demographic and clinical moderators as well as consistently identified that RA patients had significantly lower QoL than healthy controls, especially in the physical functioning areas with SF-36 physical summary scores of 34 and moderate influence on mental health components (scores = 46). The major factors contributing to impairment in quality of life included age, female sex, disease duration, and disease activity measured by DAS28 in addition to It has been established in RA, that psychological comorbidities, i.e., depression and anxiety will further impact on quality of life, therefore Latent profile analysis showed the presence of sub-groups of patients each with different levels of QoL severity, which was influenced primarily by physical function and education level. Intervention-type studies highlight the positive impacts of biologic therapies, physical activity, and multidisciplinary care for improving QoL indicators. These findings highlight the heterogeneous and multi-dimensional impairment experienced in QoL in RA.

Keywords: Rheumatoid arthritis, quality of life, health-related quality of life, meta-analysis, systematic review, physical functioning, mental health, disease activity, disability, depression, anxiety, sf-36, health assessment questionnaire, biologic therapy, patient education, disease duration, demographic factors, psychosocial factors, latent profile analysis, treatment outcomes.

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic systemic autoimmune disorder that mainly affects joints and causes progressive inflammation, pain, stiffness, and eventual disability. It severely detracts from patients' quality of life (QoL) by restricting physical function, increasing pain, and causing psychological distress in the form of anxiety and depression. The multidimensional concept of health-related quality of life (HRQoL) includes physical, mental, and social domains, all of which are negatively impacted by RA (Sadawy Salim, A. *et al.*, 2024; Song, Y. *et al.*, 2024; Matcham, F. *et al.*, 2014). Research consistently demonstrates that RA patients have significantly lower HRQoL scores than healthy individuals and those with other chronic diseases (Goma, S. H. *et al.*, 2019), and Disease duration and activity, as well as patient factors such as age, sex, and educational attainment, have been recognized as major determinants of QoL variation in RA (Feng, J. *et al.*, 2024; Ribeiro, A. A. 2022; Aslam, F. & Khan, N. A. 2018). Additionally, psychological comorbidities like depression and anxiety also

compound QoL impairment (1,9) which Some studies suggest the existence of different HRQoL profiles in RA populations, which necessitates personalized approaches to care (Goma, S. H. *et al.*, 2019) however according to Treatment goals now focus on enhancing QoL in addition to managing inflammation and joint destruction (Tarekegn, T. B. *et al.*, 2024) furthermore Therapeutic interventions such as biologic agents, exercise, and patient education have shown variable success in reducing QoL impairment (Huang, R. *et al.*, 2024) as well as optimizing QoL is a significant challenge given heterogeneity in disease expression and psychosocial influences (Karačić, A. *et al.*, 2023).

METHODOLOGY

The process of conducting a meta-analysis of the impact of rheumatoid arthritis on quality of life begins with the clear definition of the research question to direct the study. For instance, the question can be formulated as, What is the overall effect of rheumatoid arthritis on patients' quality of

life as provided in different quantitative studies. The specificity ensures that the meta-analysis covers relevant areas of quality of life, such as physical health, mental status, and social functioning, and also limits the study population to adult patients with rheumatoid arthritis, hence conforming to the characteristics of notable research. Furthermore, the second step is to perform an extensive literature search for studies of relevance. This entails searching PubMed, Google Scholar, Scopus, and the Cochrane Library using deliberately selected keywords—such as "rheumatoid arthritis," "quality of life," "health-related quality of life," "meta-analysis," and "systematic review." Given that earlier research demonstrated consistent results among recent studies, it is essential to include only peer-reviewed articles published within a recent period (e.g., the past 10 years) to provide up-to-date evidence. Using inclusion criteria guarantees studies chosen explicitly to target adult RA patients and quantitatively assess QoL (for instance, through SF-36 or HAQ tools). In a bid to uphold scientific rigor, studies with missing quantitative QoL data, those targeting juvenile arthritis, case reports, or non-English publications without translation, should be excluded. Selection should commence by screening titles and abstracts, then full-text reviews for eligibility confirmation. Following study selection, data are extracted carefully. Key data to extract are authorship, year of publication, study design, sample details, QoL instruments, and statistical results in the form of means, standard deviations, and effect sizes. Extraction of patient demographic and disease variables like age, sex, and disease duration is important for future subgroup analyses, since previous findings suggested that these variables impact QoL results. Summarizing these particulars in standard tables enhances uniformity. It makes comparison between studies easier, as well. The quality of the included studies must be evaluated to make sure of dependable conclusions and. This means using assessment tools pertinent to the type of study, like AMSTAR 2 for meta-analyses and systematic reviews, and the Newcastle-Ottawa Scale for observational studies. Included studies must be rated as moderate to high quality to represent best practices illustrated in the literature reviewed.

The statistical analysis applies meta-analytic techniques to combine research results consist of (Effect sizes, such as standardized mean differences, need to be calculated to describe the

size of rheumatoid arthritis' (RA) impact on quality of life (QoL) both overall and in specific domains) moreover Given the variability observed in previous studies—including variation in populations, measures, and settings—a random-effects model is recommended to capture both intra- and inter-study variability in addition to The extent of heterogeneity should be examined using the I^2 statistic, which guides the interpretation of results coherence. Subgroup analyses are necessary to examine how moderators like age, sex, and disease duration moderate QoL results, in accordance with evidence showing that these variables influence impairment severity. Sensitivity analyses, such as the removal of studies with lower quality scores, should confirm the stability and robustness of the results. The Findings refer to the need for interpretation that needs to consider not just statistical significance but also clinical relevance. Results usually demonstrate that RA has a severe impact on physical domains of QoL, while mental and social domains are affected to a varying degree. Of note, poorer outcomes are frequently observed in older patients and women, factors that may require specific clinical interventions and Limitations of the studies such as publication bias, QoL instrument variability, and heterogeneity should be considered in order to place conclusions in their proper context, finally the reporting of results must be transparent and complete, using forest plots to present individual and combined effect sizes graphically, confidence intervals to express precision, and funnel plots to examine publication bias as well as Tabular summaries of demographic and methodologic characteristics also facilitate transparency and reproducibility. In total, this approach guarantees a systematic, stringent process of measuring and conceptualizing the harmful impacts of rheumatoid arthritis on patient quality of life, with evidence to justify intervention development and better patient management initiatives.

Inclusion criteria generally require that:

- Participants are adult patients diagnosed with rheumatoid arthritis.
- Studies report quantitative measures of quality of life, frequently using validated instruments such as the SF-36 or HAQ.
- The studies are observational or interventional designs suitable for meta-analysis (e.g., randomized controlled trials, cohort studies).
- The studies are published in peer-reviewed journals, often within a recent timeframe,

typically the last 10 years, to ensure up-to-date evidence.

- Data reported includes means, standard deviations, or effect sizes for QoL outcomes.

Exclusion criteria typically include:

- Studies involving juvenile or pediatric arthritis patients rather than adults.
- Studies lacking quantitative QoL data or focusing exclusively on qualitative assessments.
- Non-peer-reviewed articles, abstracts, case reports, or letters.
- Non-English language publications without accessible translations.
- Studies with severe methodological limitations or high risk of bias.
- Patients with comorbid conditions that affect consciousness or cognition (e.g., dementia), psychiatric disorders, or sensory impairments (hearing/visual) might confound QoL reporting.

RESULTS

Table 1: Bibliographic Information and Study Objectives of Meta-Analyses on Rheumatoid Arthritis and Quality of Life

Authors	Title	Year	Objective
Faith Matcham <i>et al.</i>	The impact of rheumatoid arthritis on quality of life assessed using the SF-36: a systematic review and meta-analysis	2014	Assess the impact of RA on HRQoL using SF-36 in a meta-analysis.
Yuqing Song <i>et al.</i>	Health-related quality of life profiles in patients with rheumatoid arthritis: a latent profile analysis	2024	Identify HRQoL subgroups among RA patients, exploring variables affecting profile membership.
Asmaa Sadawy Salim <i>et al.</i>	Quality of Life for Patients with Rheumatoid Arthritis	2024	Assess the quality of life for patients with RA, correlating with depression and disability metrics.
Samar H. Goma <i>et al.</i>	Impact of rheumatoid arthritis on the quality of life and its relation to disease activity	2019	Examine RA's impact on QoL and relation to disease activity in an Egyptian cohort.
Nithya S Katchamart <i>et al.</i>	Determinants of health-related quality of life in adults living with rheumatoid arthritis: a systematic review	2024	Synthesize determinants of HRQoL in RA, highlighting major demographic and clinical factors.
BryanHousePub (Journal of Clinical Medicine Practice)	Meta-analysis: The Impact of Different Therapies on the Quality of Life in Rheumatoid Arthritis	2024	Meta-analysis of different therapies' effect on RA patients' quality of life.
BMJ Open (Shandong University group)	Correlation between disease activity and patient-reported health-related quality of life in rheumatoid arthritis: a cross-sectional study	2024	Examine HRQoL in RA by disease activity and the correlation between clinical and patient-reported outcomes.

Table 2: Study Samples, Research Methods, and Key Contributions

Sample & Methods	Contribution
31 studies, 22,335 RA patients; systematic review of studies using SF-36; meta-analysis with random-effects model	Quantified pooled HRQoL (physical/mental) in RA; identified age, sex, and disease duration's differential impact.
151 RA patients, multi-center in China; cross-sectional, latent profile analysis, SF-36, HAQ, CDAI, self-efficacy used	Classified RA patients into three distinct HRQoL profiles; linked function and education to profile membership.
100 RA patients in Egypt; descriptive exploratory study using surveys (HAQ, AIMS, Hamilton, Zung scales)	The study showed that the majority of patients had poor QoL, linked disability, and mood to lower scores.

Cross-sectional, 50 Egyptian RA patients; QoL measured via SF-36, WHOQOL, HAM-A, Zung—relation to DAS-28 and functional indices	Strong correlation between disease activity/functional status and multiple QoL domains; sexual function is also impaired.
Systematic review: a wide range of studies included	Synthesized the broadest evidence base for HRQoL determinants in RA (age, gender, duration, functional status).
Review/meta-analysis, multiple RCTs and observational studies; different therapy comparisons	Quantified practical effect sizes for interventions (biologics, DMARDs, exercise) on RA QoL.
314 RA patients in China; cross-sectional observational; clinical and patient-reported HRQoL measures	Showed higher disease activity associated with worse QoL across multiple HRQoL instruments and domains.

Table 3: Main Findings and Conclusions of Meta-Analyses on Rheumatoid Arthritis and Quality of Life

Results	Conclusions
SF-36 physical summary ~34 (low), mental summary ~46; higher age = poorer physical but better mental health; all RA significantly reduced QoL vs healthy.	RA has a substantial, multi-domain negative impact on HRQoL; regular assessment is warranted.
Three patient HRQoL profiles identified: 61% poor, 30% moderate, 9% good; worse physical function/education predicts poor profile.	Targeting interventions to distinct patient HRQoL groups may improve RA care outcomes.
66% had poor QoL; strong negative correlations with disability and mood; nearly 25% had severe daily disability.	Disability, anxiety, and depression are the main drivers of poor QoL in RA. Educational support suggested.
QoL impairment correlated highly with disease activity (DAS28), anxiety, depression, and disability; sexual function was negatively affected with active RA.	A multi-faceted intervention should address disease activity, mood, and sexual health.
Age, gender (female), and disease duration are robust predictors of lower RA quality of life across populations.	Targeted prevention/management should focus on high-risk groups based on these determinants.
Biologic therapies, physical activity, and comprehensive management show measurable improvements in RA QoL outcomes.	Evidence-based, tailored therapy selection is supported to optimize QoL.
Disease activity strongly correlates with both overall and specific HRQoL impairments; psychosocial effects are observed.	Aggressive disease control improves both physical and psychosocial aspects of QoL.

DISCUSSION

Based on the results of meta-analyses and systematic reviews of rheumatoid arthritis (RA) and quality of life (QoL), an academic discussion can be developed that identifies key findings, compares these with existing literature, and discusses clinical implications following The current meta-analytic data confirm that rheumatoid arthritis substantially compromises several domains of health-related quality of life (HRQoL), and especially physical functioning, as reflected in consistently low SF-36 physical component scores (of about 34) across pooled studies of more than 22,000 patients where in our result is consistent with the clinical course of RA, which is well documented, and in which chronic inflammation and damage to joints cause functional disability and pain that severely limit physical ability (Matcham, F. *et al.*, 2014). The mental health

aspect of QoL, although also lower than in normative groups, tends to show less severe impairment (with pooled scores of about 46), which may reflect relative resilience or perhaps compensatory adaptation for psychological well-being in some patients furthermore the heterogeneity within QoL outcomes can be explained by patient age, sex, disease duration, and psychosocial factors. Older age was linked with worse physical QoL but relatively better mental health outcomes, corroborating previous research indicating a complex interaction between disease effect and psychological adjustment with time. Female patients had poorer mental health-related QoL, aligning with other research indicating greater depression and anxiety prevalence in women with RA (Sadawy Salim, A. *et al.*, 2024). Disease duration was positively associated with mental health QoL, which may be due to

adjustment or successful coping strategies evolving with chronicity.

The impact of psychological factors like depression and anxiety became prominent in a number of studies. In addition, to Depression was inversely related to all domains of QoL, highlighting its position as an important mediator of compromised life quality in RA patients (Song, Y. *et al.*, 2024; Bounabe, A. *et al.*, 2024). This is consistent with the general literature promoting holistic models of care covering the physical as well as mental dimensions of RA where Subgroup analyses of latent profile studies reveal the existence of unique QoL profiles in RA populations—clusters of poor, moderate, and good QoL—characterized primarily by physical function and level of education, and Such evidence highlights the necessity for individualized rather than one-size-fits-all interventions. The finding of educational achievement as a predictor of QoL points to the role of socioeconomic factors and health literacy in potentially moderating disease burden and coping effectiveness, which, in cross-sectional studies across different populations, these findings are supported. For example, studies in Egyptian and Chinese cohorts confirm that disease activity as measured by DAS28 scores is inversely related to quality of life (QoL) and that sexual dysfunction and social restrictions are other common but often neglected aspects of rheumatoid arthritis (RA) morbidity (Kou, H. *et al.*, 2023), so These studies highlight the multifaceted impact of RA beyond joint symptoms and the need for holistic management approaches.

Intervention-specific analyses show that both biologic therapy and physical activity yield quantifiable benefit across QoL domains, supporting guideline imperatives that address both disease control and functional status improvement (BryanHousePub, 2024). These results argue for both timely and aggressive therapeutic approaches, as well as non-pharmacologic approaches like physical rehabilitation and patient education in order to maximize outcomes.

CONCLUSION

we concluded the identification of distinct QoL profiles within RA populations suggests that personalized interventions, sensitive to patients' physical capabilities, educational background, and psychosocial status, are essential to optimize outcomes Furthermore, the demonstrated benefits of biologic therapies, physical activity, and comprehensive management approaches

emphasize the importance of integrated care targeting both disease activity and broader life quality dimensions however the methodological heterogeneity and study limitations exist, these findings robustly support the prioritization of routine QoL assessment in clinical practice and the development of holistic treatment models.

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