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Chromium Supplementation Use in Rheumatic Diseases

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ABSTRACT

Objective: To evaluate the current evidence on chromium (Cr) supplementation in patients with rheumatic diseases.

Methods: A comprehensive literature search was conducted in the PubMed, SciELO, and LILACS databases covering the period from 1965 to May 2024, with no language restrictions applied. Review articles and in vivo or in vitro experimental studies were excluded. Only clinical studies in humans with rheumatic diseases were considered eligible.

Results: The search yielded no clinical studies investigating chromium supplementation in patients with rheumatic diseases. Some observational studies evaluated serum chromium levels in patients with rheumatoid arthritis, but their findings were inconsistent. Moreover, animal models of rheumatoid arthritis demonstrated potential anti-inflammatory effects of chromium supplementation, comparable to those of prednisolone. However, these results are not directly translatable to humans.

Conclusion: Currently, there is no published clinical evidence supporting the use of chromium supplementation in patients with rheumatic diseases. Future clinical trials are warranted to investigate its potential therapeutic role.

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Chromium (Cr) is an essential trace mineral that plays a critical role in human metabolism, particularly in the regulation of carbohydrate, lipid, and protein metabolism [1]. It functions as a cofactor that enhances insulin activity, thereby contributing to glucose homeostasis and influencing lipid metabolism through mechanisms that improve insulin sensitivity and reduce oxidative stress. Beyond its metabolic effects, chromium has also been proposed to possess anti-inflammatory and immunomodulatory properties, which have attracted scientific interest regarding its potential role in chronic inflammatory diseases, including rheumatic disorders.

A clinical study investigating serum Cr levels in patients with rheumatoid arthritis (RA) reported significantly lower chromium concentrations in RA patients compared with healthy individuals [2]. The authors suggested that chromium deficiency might contribute to increased oxidative stress or metabolic imbalance within the inflammatory milieu of RA. However, other studies failed to confirm these findings, showing no significant differences in serum Cr levels between RA patients and controls [3]. Such discrepancies may arise from heterogeneity among study populations, variations in dietary chromium intake, disease duration and activity, analytical techniques used for trace element quantification, or confounding variables such as renal function and concomitant medication use. Consequently, the association between chromium status and RA remains controversial and inconclusive.

Experimental studies have provided preliminary insights into chromium's potential therapeutic effects. In a rat model of rheumatoid arthritis, chromium supplementation induced marked clinical and histopathological improvement, characterized by reduced joint swelling, attenuation of synovial inflammation, and preservation of cartilage integrity [4]. Biochemical analyses demonstrated a downregulation of pro-inflammatory cytokines such as TNF-α and IL-6, along with modulation of oxidative stress markers. Interestingly, the anti-inflammatory response was comparable to that observed with prednisolone, suggesting that chromium may exert glucocorticoid-like effects, potentially mediated through antioxidant mechanisms or intracellular signaling

pathways. Nevertheless, these promising preclinical findings cannot be directly extrapolated to humans, as experimental conditions differ substantially from clinical scenarios.

Given these observations, it is both logical and scientifically relevant to investigate whether chromium supplementation could have a therapeutic impact in patients with rheumatic diseases, particularly RA and other systemic autoimmune conditions. To explore this hypothesis, a comprehensive literature search was conducted in the PubMed, SciELO, and LILACS databases, covering the period from 1965 to May 2024. No language restrictions were applied, ensuring broad inclusion of international publications. Review articles and experimental in vivo or in vitro studies were excluded to focus exclusively on clinical research involving human participants with rheumatic diseases.

Despite this extensive and systematic search, no clinical trials or observational studies were identified that directly evaluated chromium supplementation in patients with rheumatic diseases. The available evidence remains indirect, limited to serum chromium measurements and animal model findings. This striking gap in the literature underscores the lack of translational research bridging basic scientific discoveries and clinical applications.

In conclusion, the current body of evidence does not support any definitive role for chromium supplementation in the management of rheumatic diseases. While preclinical studies indicate potential anti-inflammatory and antioxidant properties, these effects have not been confirmed in human populations. Future randomized controlled trials are warranted to determine chromium's therapeutic potential, optimal dosing strategies, safety profile, and possible interactions with standard rheumatologic therapies. Such investigations are essential to clarify whether chromium could serve as a beneficial adjunctive agent in managing chronic inflammatory conditions.

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Author contribution: JF Carvalho has written and submitted all parts of this article, including the conclusion, analysis, literature search, writing, revision, and submission.

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