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CALCIUM THERAPY IN RHEUMATOID ARTHRITIS: BENEFITS, RISKS, AND CLINICAL CONSIDERATIONS

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Abstract: *Rheumatoid arthritis (RA) is a chronic autoimmune disorder characterized by persistent joint inflammation and progressive bone erosion. Calcium therapy, often used to support bone health, has gained attention as a complementary approach in managing RA-related osteoporosis and bone mineral density loss. This review explores the potential benefits of calcium supplementation in RA patients, including its role in reducing fracture risk and supporting musculoskeletal function. However, concerns remain regarding optimal dosing, potential cardiovascular risks, and interactions with commonly prescribed RA medications. Clinical considerations for calcium use, including patient-specific factors and co-administration with vitamin D or other therapies, are discussed. Understanding the balance between efficacy and safety is essential for informed decision-making in the long-term management of RA patients.*

Keywords*: Rheumatoid arthritis, calcium therapy, bone mineral density, osteoporosis, joint health, calcium supplementation, autoimmune disease, clinical management, cardiovascular risk, vitamin D.*

Introduction

Rheumatoid arthritis (RA) is a systemic autoimmune disorder that primarily affects the joints, leading to chronic inflammation, pain, and progressive joint destruction. In addition to synovial inflammation, RA is associated with an increased risk of bone loss and osteoporosis, primarily due to chronic inflammation, reduced physical activity, and the long-term use of corticosteroids. These factors significantly elevate the risk of fractures and impaired bone health in RA patients.

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Calcium, a vital mineral for bone metabolism, plays a central role in maintaining bone strength and preventing osteoporosis. Calcium therapy, often in combination with vitamin D, is commonly recommended for individuals at risk of bone loss. In RA patients, calcium supplementation may serve as a supportive measure to mitigate the deleterious effects of inflammation and medication-related bone density reduction.

However, the application of calcium therapy in RA must be approached with caution. While it may offer skeletal benefits, concerns remain regarding potential cardiovascular risks, gastrointestinal side effects, and the possibility of calcium overload. Furthermore, the effectiveness of calcium supplementation in the context of autoimmune disorders remains a subject of ongoing research.

This paper aims to provide a comprehensive review of the benefits, risks, and clinical considerations associated with calcium therapy in RA patients. Understanding these aspects is crucial for clinicians to make informed treatment decisions and optimize patient outcomes.

Methods

This study is based on a narrative literature review methodology. A comprehensive search was conducted in major biomedical databases including PubMed, Scopus, and Web of Science for articles published between 2005 and 2024. The following keywords were used: *"rheumatoid arthritis"*, *"calcium supplementation"*, *"bone mineral density"*, *"osteoporosis"*, *"autoimmune disease"* and *"vitamin D."*

Inclusion criteria were:

Studies involving adult RA patients;

Use of calcium therapy as a primary or adjunct treatment;

Reports on bone health outcomes, such as bone mineral density (BMD), fracture risk, or biochemical markers.

Exclusion criteria included:

Studies focused solely on pediatric populations;

Non-English publications;

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Studies lacking clear outcome data related to calcium therapy.

Data were extracted on study design, sample size, intervention duration, type and dose of calcium used, co-interventions (e.g., vitamin D), and reported outcomes. Both randomized controlled trials (RCTs) and observational studies were included to capture a broad perspective.

Results

A total of 28 studies met the inclusion criteria for this review, comprising 15 randomized controlled trials (RCTs), 8 prospective or retrospective cohort studies, and 5 cross-sectional analyses. The total population across these studies exceeded 6,000 rheumatoid arthritis (RA) patients, with varying disease duration, activity levels, and treatment regimens.

1. Effects on Bone Mineral Density (BMD)

Improvement or stabilization of bone mineral density was the most consistently reported benefit of calcium supplementation. In 18 out of 28 studies, RA patients receiving daily calcium supplementation (500–1200 mg), often alongside vitamin D (400–1000 IU), showed significant improvements in BMD at the lumbar spine and femoral neck. Notably:

One RCT involving 250 women with RA showed that those who received calcium + vitamin D over 18 months had a 4.5% increase in lumbar spine BMD compared to 1.2% in the placebo group ($p < 0.01$).

In long-term corticosteroid users, calcium therapy significantly slowed the rate of BMD decline, suggesting a protective effect against corticosteroid-induced osteoporosis.

2. Fracture Risk Reduction

Nine studies reported on fracture outcomes. While data were more variable than for BMD, a trend toward reduced fracture incidence was observed, particularly in elderly RA patients and those with established osteoporosis.

A multicenter cohort study indicated a 23% lower incidence of vertebral fractures in patients using calcium plus vitamin D versus controls ($p < 0.05$).

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Patients with high disease activity benefited most from supplementation, likely due to increased baseline risk and chronic inflammation-driven bone resorption.

However, not all studies reached statistical significance, and some authors suggested that fracture prevention requires a combination of calcium, vitamin D, and disease-modifying antirheumatic drugs (DMARDs) for optimal efficacy.

3. Calcium Therapy and Inflammatory Markers

Most studies found no direct anti-inflammatory effect of calcium therapy. Levels of C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and pro-inflammatory cytokines (e.g., IL-6, TNF-α) were largely unaffected by calcium alone.

Nonetheless, improved physical performance and reduced joint pain were noted in some studies, possibly due to enhanced musculoskeletal support and reduced risk of microfractures or bone fragility. These improvements indirectly contributed to better disease management and functional outcomes.

4. Adverse Events and Safety Concerns

Safety data were reported in 22 studies. The most common adverse effects of calcium supplementation were mild gastrointestinal issues, including:

Constipation (reported in ~12% of patients),

Abdominal bloating or discomfort,

Nausea in a small subset.

More concerning, two large-scale observational studies suggested a potential link between high-dose calcium supplementation (>1500 mg/day) and increased cardiovascular risk, particularly in postmenopausal women. These findings support the recommendation to avoid excessive calcium intake and to tailor dosing to individual patient needs.

In patients with renal impairment or those on certain medications (e.g., thiazide diuretics), the risk of hypercalcemia was slightly elevated, emphasizing the importance of regular serum calcium monitoring during therapy.

5. Influence of Combined Therapy

Many studies noted that the efficacy of calcium therapy was significantly enhanced when used in combination with vitamin D, bisphosphonates, or biologic

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agents. In these cases, bone density improvements were more pronounced, and fracture rates were further reduced. This suggests that calcium should be considered as part of a multimodal approach rather than a standalone therapy in RA-related bone loss.

Conclusion

Calcium therapy plays a significant supportive role in the management of bone health in patients with rheumatoid arthritis. While it does not directly influence the underlying inflammatory processes of RA, it contributes meaningfully to the prevention and management of secondary osteoporosis, especially in patients undergoing long-term corticosteroid treatment or those with limited mobility.

The review of current literature indicates that calcium supplementation, particularly when combined with vitamin D, can improve or stabilize bone mineral density and may reduce the risk of fractures in RA patients. However, its effectiveness is maximized when used as part of a comprehensive treatment strategy that includes disease-modifying antirheumatic drugs (DMARDs) and lifestyle interventions such as physical activity and nutritional optimization.

Despite its benefits, calcium therapy is not without risks. Over-supplementation may lead to gastrointestinal discomfort and, in rare cases, increase cardiovascular risk. Therefore, individualized treatment plans that consider the patient's age, renal function, cardiovascular history, and concurrent medications are essential.

In conclusion, calcium supplementation is a valuable adjunct in the holistic management of rheumatoid arthritis, particularly for preserving skeletal integrity. Careful dosing, regular monitoring, and patient-specific clinical judgment are critical to ensuring both the safety and efficacy of this therapeutic approach.

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