Gluten and Lactose Intolerance Are Associated With Increased Risk of Osteoporosis, Fragility Fractures, and Arthroplasty in Postmenopausal Women: A Matched Cohort Study

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Abstract:

Background: Gluten and lactose intolerance are gastrointestinal conditions that may lead to chronic malabsorption, inflammation, and altered nutrient intake—factors that can negatively affect bone and joint health. This study examines the long-term risk of osteoporosis, fragility fractures, and arthroplasty among postmenopausal women with gluten or lactose intolerance.

Methods: A retrospective matched cohort study was performed using a large multi-institutional electronic health record database. Postmenopausal patients diagnosed with gluten or lactose intolerance were matched 1:1 to controls without these conditions based on age, race, and comorbidities. Patients with prior diagnoses of osteoporosis, fragility fractures, or total joint arthroplasty at baseline were excluded. Outcomes assessed at 3, 4, and 5 years included incident osteoporosis, site-specific fragility fractures (vertebral, distal radius, and foot/ankle), and arthroplasty procedures (total knee arthroplasty [TKA], total hip arthroplasty [THA], and total shoulder arthroplasty [TSA]). Hazard ratios (HR) with 95% confidence intervals (CI) were calculated.

Results: At 3 years, gluten or lactose intolerance was significantly associated with increased risk of osteoporosis (HR 2.83, 95% CI 2.20–3.64, p<0.001), vertebral fractures (HR 2.14, p=0.009), distal radius fractures (HR 4.88, p=0.001), and foot/ankle fractures (HR 2.46, p=0.006). Risk of TKA was elevated (HR 3.31, p=0.003), while THA, TSA, and osteoporosis drug treatment did not differ significantly.

At 4 years, elevated risks persisted for osteoporosis (HR 2.12, p<0.001), vertebral fractures (HR 1.53, p=0.043), distal radius (HR 2.29, p=0.007), and foot/ankle fractures (HR 2.25, p=0.001). TKA risk remained elevated (HR 2.91, p=0.001), and osteoporosis treatment became significantly more common (HR 1.32, p=0.007).

By 5 years, increased risks continued for osteoporosis (HR 1.41, p<0.001), vertebral (HR 1.43, p=0.027), and foot/ankle fractures (HR 1.67, p=0.005). THA became significantly more common (HR 3.24, p<0.001), while TKA and TSA showed no significant differences. Osteoporosis treatment remained higher in the intolerance cohort (HR 1.33, p=0.001).

Conclusion: Postmenopausal women with gluten or lactose intolerance have a significantly higher long-term risk of osteoporosis, select fragility fractures, and lower extremity arthroplasty—particularly TKA and THA—compared to matched controls. These findings highlight the need for proactive musculoskeletal screening and nutritional management in this high-risk population.