

Celiac Disease is Associated with Increased Risk of Distal Radius Fractures Independent of Osteoporosis

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INTRODUCTION: Celiac disease (CD) is associated with metabolic bone disorders and increased fracture risk, at least partially attributed to impaired calcium absorption and osteoporosis. However, the independent effect of CD on distal radius fractures (DRF) remains unclear. The current study aimed to evaluate the risk of DRF among patients with CD, while controlling for osteoporosis and comorbidity burden.

METHODS: This retrospective database study utilized the PearlDiver Mariner 170 Patient Claims Database. Studies utilizing this database have been determined to be exempt from review by our IRB as data are de-identified and aggregated. The experimental CD study group was identified by querying for patients in the database 2016-2022 with the International Classification of Diseases (ICD) codes for CD. The control non-CD cohort was identified by creating a random sample of 500,000 patients without celiac diagnoses during the same time period. Exclusion criteria included those with history of neoplasm or infection within 90 days of DRF. The CD and non-CD cohorts were then matched 1:1 based on age, sex, Elixhauser Comorbidity Index (ECI), and osteoporosis diagnoses. Finally, rates of DRF were compared between the CD and non-CD groups before and after matching.

RESULTS: A total of 290,617 patients with CD and 288,752 controls were identified after restricting to patients active in the database from 2016-2022. Prior to matching, CD patients were older on average (47.1 vs. 42.6 years, $p<0.001$), more often female (75.4% vs. 61.2%, $p<0.001$), and had a greater comorbidity burden (ECI 4.52 vs. 0.16, $p<0.001$). Osteoporosis prevalence was higher in CD patients (12.8% vs. 7.1%, $p<0.001$), as was DRF prevalence (1.15% vs. 0.89%, $p<0.001$).

After matching, 47,646 patients remained in each cohort, balanced for demographics, ECI, and osteoporosis ($p=1.000$ for all). Despite this, DRF prevalence remained significantly elevated in CD cohort (1.92% vs. 1.61%, $p=0.0019$), representing a relative increase of 19%. DRF incidence rate also remained elevated in CD patients (27.5 per 10,000 patient-years vs. 22.9 per 10,000 patient-years) (Figure 1).

DISCUSSION: CD was associated with an increased DRF risk independent of osteoporosis, suggesting additional mechanisms beyond the diagnosis of low bone mineral density may contribute to skeletal fragility in this population.

SIGNIFICANCE/CLINICAL RELEVANCE: This large, national study indicates that CD may be an independent risk factor for DRFs. Clinicians should consider early bone health assessment and targeted fracture prevention strategies in CD patients, even in the absence of osteoporosis.

IMAGES AND TABLES:

Incidence of DRF in patients with celiac disease relative to no celiac disease

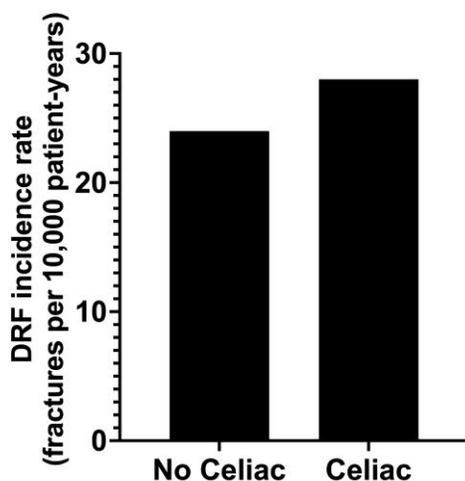


Figure 1. Distal radius fracture incidence rate (reported in fractures per 10,000 patient-years) in matched cohorts of patients with celiac disease relative to without celiac disease. All patients included in this study were active in the database from 2016-2022 and contributed 7 patient-years of time.