Atopic Conditions Are Associated With Increased Osteoporosis and Fragility Fracture Risk in Menopausal Patients: A Matched Cohort Study

Authors: Joshua Wang, Philong Nguyen, Carolyn Henein, William M Weiss MD

Institution: University of Texas Medical Branch

Abstract:

Background: Atopic conditions such as asthma, allergic rhinitis, and eczema are marked by chronic inflammation and immune dysregulation, which may negatively affect bone health. While postmenopausal women are already at increased risk for osteoporosis and fractures, the contribution of atopic diseases to skeletal fragility in this population is not well defined. This study evaluates the relationship between atopic conditions and bone mineral density (BMD) outcomes in menopausal patients.

Methods: A retrospective matched cohort study was conducted using a large multi-institutional electronic health record database. Menopausal patients diagnosed with allergic rhinitis (ICD-10: J30*.), eczema (L20.*), or asthma (J45*.) were identified and matched 1:1 to patients without atopic diagnoses based on age, race, comorbidities, and other baseline characteristics. Patients with prior diagnoses of osteoporosis (M80–M82) or fragility fractures (S72.0*, S52.5*, M80.08XA) before cohort entry were excluded. Outcomes were assessed at 1, 3, and 5 years and included new diagnoses of osteoporosis, fragility fractures (including femoral neck, vertebral, distal radius, and foot/ankle), DEXA screening utilization, and osteoporosis medication initiation. Hazard ratios (HR) with 95% confidence intervals (CI) were calculated.

Results: At 1 year, patients with atopic conditions had significantly higher risks of osteoporosis (HR 2.04, 95% CI 1.83–2.27, p<0.001), vertebral fractures (HR 2.24, 95% CI 1.61–3.12, p<0.001), distal radius fractures (HR 2.20, 95% CI 1.41–3.42, p<0.001), and foot/ankle fractures (HR 2.30, 95% CI 1.67–3.17, p<0.001). Femoral neck fracture risk was elevated but not statistically significant (HR 1.54, p=0.057). DEXA screening was more frequent (HR 1.64, p<0.001), but osteoporosis medication initiation did not differ significantly (HR 1.01, p=0.726).

At 3 years, the atopic cohort remained at elevated risk for osteoporosis (HR 1.90), femoral neck fracture (HR 1.74), vertebral (HR 1.94), distal radius (HR 1.59), and foot/ankle fractures (HR 2.18), all p<0.001. Screening (HR 1.68) and treatment (HR 1.20) rates were significantly higher (p<0.001).

At 5 years, increased risks persisted for osteoporosis (HR 1.44) and all fracture types: femoral neck (HR 1.25), vertebral (HR 1.44), distal radius (HR 1.32), and foot/ankle (HR 1.61) — all p<0.001. DEXA screening (HR 1.71) and treatment (HR 1.20) rates remained elevated (p<0.001).

Conclusion: Among menopausal patients, atopic conditions are independently associated with a higher risk of osteoporosis and multiple fragility fractures over a 5-year period. Although these patients are more likely to undergo bone density screening and receive pharmacologic treatment, their elevated risk persists. These findings underscore the need for early identification and proactive bone health management in postmenopausal women with atopic disease.