Sex and Age-Specific Medication Interaction in Osteoporosis Risk: A Comprehensive Analysis

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Background: Osteoporosis is a common condition that affects many older adults. Current screening guidelines target patients with a history of fractures and may miss patients who are taking medications that increase osteoporosis risk. This study investigates the relationship between the use of levothyroxine, antiepileptics, and corticosteroids and osteoporosis prevalence in individuals aged 50-90 without a history of fractures to determine the risks associated with chronic use.

Methods: This retrospective cohort study analyzed data from a database for patients aged 50–90 years from 2011 to 2023. The exposed group comprised individuals prescribed corticosteroids, levothyroxine, or antiepileptic drugs, while the control group was not prescribed these medications. Osteoporosis was diagnosed utilizing ICD-9 codes 733.01, 733.02, 733.03, 733.09, V82.81, V13.51, V49.81 and ICD-10 codes Z13.820, Z78.0, Z87.310, M80, M81, M81.0, M81.6, M81.8. Exclusion criteria included prior osteoporotic fractures or conditions predisposed to fractures. Osteoporosis prevalence and relative risk were calculated for each group, stratified by age and sex, and compared across medication groups.

Results: The study included 446,075 after exclusions, with male and female patients accounting for 39% and 61% of the population, respectively. Osteoporosis prevalence was highest in the exposed group (levothyroxine: 55.42%, corticosteroids: 35.51%, antiepileptics: 35.37%) compared to 25.92% in the control group. The relative risk for osteoporosis was most significant in levothyroxine users (RR=2.14), followed by corticosteroids (RR=1.37) and antiepileptics (RR=1.36). In the exposed group, women exhibited higher prevalence across all medication types, with levothyroxine users showing the highest odds ratio (OR=3.00 in women vs. OR=2.19 in men). Prevalence increased with age, with older patients in the exposed group having the highest rates.

Conclusions: This study highlights the significant effect of levothyroxine, corticosteroids, and antiepileptics on osteoporosis prevalence, with notable sex disparities. Levothyroxine users, especially women, demonstrated the highest relative risk and odds ratio for developing osteoporosis, emphasizing the need for targeted interventions. These findings support routine osteoporosis screening and preventive measures, including bone density assessments and lifestyle interventions tailored to sex and medication exposure.