

Silicon supplementation improves the bone mineral density of calcium-deficient ovariectomized rats by reducing bone resorption.

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Abstract

The purpose of this study was to investigate the effect of silicon (Si) supplementation on bone mineral density (BMD) and bone metabolism parameters relative to calcium (Ca) intake levels in ovariectomized rats. A total of 72 female Wistar rats (6 weeks) were ovariectomized (OVX) and divided into six groups, and Si (500 mg of Si per kilogram of feed) was or was not administered with diets containing various levels of Ca (0.1%, 0.5%, and 1.5%) for 10 weeks. The groups were as follows: (1) Ca-deficient group (0.1% Ca), (2) Ca-deficient with Si supplementation group, (3) adequate Ca group (0.5% Ca), (4) adequate Ca with Si supplementation group, (5) high Ca group (1.5% Ca), and (6) high Ca with Si supplementation group. Si supplementation significantly increased the BMD of the femur and tibia in Ca-deficient OVX rats, while no change was observed with Si supplementation in the BMD of the spine, femur, and tibia in the adequate and high Ca groups. Serum alkaline phosphatase and osteocalcin levels were not affected by Si supplementation or Ca intake levels. C-telopeptide type I collagen levels were significantly decreased as a result of Si supplementation in Ca-deficient OVX rats. In summary, Si supplementation produced positive effects on bone mineral density in Ca-deficient OVX rats by reducing bone resorption. Therefore, Si supplementation may also prove to be helpful in preventing osteoporosis in postmenopausal women whose calcium intake is insufficient.