

## ARTICLES

# Exercise Effects on Bone Mineral Density in Women With Breast Cancer Receiving Adjuvant Chemotherapy

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**Purpose/Objectives:** To test the effects of aerobic and resistance exercise on changes in bone mineral density (BMD) in women newly diagnosed with stage I–III breast cancer receiving chemotherapy.

**Design:** Randomized clinical trial.

**Setting:** Two National Cancer Institute–designated cancer centers in metropolitan areas.

**Sample:** 66 women with stage I–III breast cancer beginning adjuvant chemotherapy.

**Methods:** Participants were randomized to aerobic or resistance exercise and usual care. At the beginning of chemotherapy and at six months, patients completed exercise testing and BMD assessment of the lumbar spine by dual energy x-ray absorptiometry.

**Main Research Variables:** BMD, aerobic capacity, and muscle strength.

**Findings:** The average decline in BMD was –6.23% for usual care, –4.92% for resistance exercise, and –0.76% for aerobic exercise. Aerobic exercise preserved BMD significantly better compared to usual care. Premenopausal women demonstrated significantly greater declines in BMD than postmenopausal women. Aerobic capacity increased by almost 25% for women in the aerobic exercise group and 4% for resistance exercise. Participants in the usual care group showed a 10% decline in aerobic capacity.

**Conclusions:** The data suggest that weight-bearing aerobic exercise attenuates declines in BMD and that aerobic and resistance exercise improve aerobic capacity and muscle strength at a time when women generally show marked declines in functional ability.

**Implications for Nursing:** Exercise may prevent or at least minimize bone loss observed during chemotherapy and may prevent or delay the long-term effects of osteoporosis.

### Key Points . . .

- Significant bone loss is a side effect of breast cancer treatment that often goes undetected and untreated in pre- and postmenopausal women.
- Aerobic exercise may reduce bone loss during cancer treatment.
- Resistance exercise reduces treatment-related bone loss but may be less effective because of noncompliance.
- Moderate-intensity exercise not only maintains but significantly improves aerobic capacity and muscle strength in women undergoing chemotherapy.

side effects, including early menopause, osteoporosis, and elevated risk for cardiovascular disease (Leedham & Ganz, 1999; Lower, Blau, Gadzer, & Tummala, 1999; Shapiro, Manola, & Leboff, 2001; Sklar, 1999; Van Poznak & Sauter, 2005).

Osteoporosis is a serious public health concern, and as the number of long-term cancer survivors grows, osteoporosis is becoming a costly and common long-term complication of breast cancer. Breast cancer survivors are almost five times more likely to experience a vertebral fracture a year following treatment than their healthy counterparts (Swenson,

In 2007, an estimated 180,510 women will be diagnosed with invasive breast cancer (American Cancer Society, 2007). Most patients are treated with a combination of surgery, chemotherapy, and radiotherapy. Although breast cancer mortality rates have declined in recent years, long-term treatment-related side effects have a considerable negative effect on morbidity and non-cancer-related risk of mortality (Jemal et al., 2005). The increasingly common use of adjuvant chemotherapy, particularly for breast cancer, has led to improved survival as well as a rise in long-term treatment-related

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