

# Effect of Exercise on Biomarkers, Fatigue, Sleep Disturbances, and Depressive Symptoms in Older Women With Breast Cancer Receiving Hormonal Therapy

Judith K. Payne, PhD, RN, AOCN<sup>®</sup>, Joanne Held, BSN, RN,  
Josh Thorpe, PhD, and Heather Shaw, MD

**Purpose/Objectives:** To compare the effectiveness of a prescribed home-based walking exercise intervention with usual care in older women receiving hormonal treatment for breast cancer, and to examine relationships among levels of the cortisol, serotonin, interleukin-6, and bilirubin biomarkers and fatigue, sleep disturbances, and depressive symptoms.

**Design:** Longitudinal randomized clinical trial.

**Setting:** A National Cancer Institute–designated cancer center in the southeastern United States.

**Sample:** 20 women (aged 55 years or older) with breast cancer receiving hormonal treatment.

**Methods:** Participants were randomized to a walking exercise intervention or usual care. Laboratory samples and the Pittsburgh Sleep Quality Index (PSQI), the Piper Revised Fatigue Scale, and the Center for Epidemiological Studies–Depression Scale were collected at the initial clinic visit and at 12 weeks from the groups. Questionnaires also were collected at weeks 2 and 14.

**Main Research Variables:** Fatigue, sleep disturbances, depressive symptoms, biomarkers, and exercise.

**Findings:** Effect of the exercise intervention on sleep scores was highly significant between groups. Exercise group scores on the PSQI decreased significantly over time (indicating improved sleep quality), although scores did not change significantly within the control group. Sleep actigraphy also showed significantly shorter actual wake time and less movement in the exercise group. Serotonin levels also were significantly affected by the intervention.

**Conclusions:** Data suggest that a walking exercise intervention improves sleep in older women receiving hormonal treatment for their breast cancer. Serotonin levels may be a useful biomarker when assessing sleep disturbances in this group.

**Implications for Nursing:** Clinicians need to be aware that older women receiving hormonal treatment for their breast cancer may experience fatigue, sleep disturbances, and depressive symptoms. Home-based walking activity may reduce symptom severity in this group.

## Key Points . . .

- ▶ Minimal research exists concerning symptoms experienced by older women with breast cancer receiving hormonal therapy.
- ▶ A prescribed home-based walking intervention may improve sleep in older women receiving hormonal treatment for their breast cancer.
- ▶ Select hypothalamic-pituitary-adrenal biomarkers were different between the exercise group and the usual care group.

therapy, and to experience treatment-related side effects. Despite reports that fatigue, sleep disturbances, and depressive symptoms are common side effects experienced by women receiving chemotherapy (Byar, Berger, Bakken, & Cetak, 2006), minimal research has been conducted on older women receiving hormonal therapy (Crivellari et al., 2007; Payne, Thorpe, Held, & Shaw, 2007; Wyatt & Friedman, 1996). Symptoms experienced by women with breast cancer, including older women, have been well-described in the literature; however, few investigations have singularly focused on older women receiving hormonal therapy for breast cancer.

Relatively little information is available about what interventions may help alleviate the symptoms or the extent to which select physiologic factors, such as biomarkers, may influence the distressing symptoms. Although exercise has

---

*Judith K. Payne, PhD, RN, AOCN<sup>®</sup>, is an assistant professor in the School of Nursing and Joanne Held, BSN, RN, is a study coordinator, both at Duke University Medical Center in Durham, NC; Josh Thorpe, PhD, was an assistant research professor in the School of Nursing at Duke University in Durham; and Heather Shaw, MD, is an assistant professor in medicine–oncology at Duke University Medical Center. This study was funded by a grant from the National Institute of Nursing Research 2 P20 NR007795. No financial relationships to disclose. Mention of specific products and opinions related to those products do not indicate or imply endorsement by the Oncology Nursing Forum or the Oncology Nursing Society. (Submitted July 2007. Accepted for publication November 21, 2007.)*

Digital Object Identifier: 10.1188/08.ONF.635-642

**B**reast cancer is the most common type of cancer in women, accounting for about 30% of all cancers in women in the United States (Jemal et al., 2007). The risk for breast cancer increases significantly with age and is a major health concern. Although treatment varies according to disease stage and presence of other comorbidities, women aged 55 years and older are likely to require additional treatment following surgery, including chemotherapy or hormonal