Effects of Exercise on Sleep in Women with Breast Cancer: A Systematic Review

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KEYWORDS

• Sleep deficiency • Exercise • Intervention • Breast cancer • Systematic review

KEY POINTS

- Eleven of the 15 studies meeting inclusion criteria showed improvement in sleep; all walking interventions resulted in positive sleep outcomes but the exercise-based integrative interventions (eg, yoga) showed inconsistent sleep outcomes.
- Most exercise interventions designed to improve sleep in women with breast cancer were aerobic; most studies used only self-report measures and were conducted during treatment and in several countries.
- Exercise interventions varied in frequency and intensity as well as participant adherence.
- A synthesis of these review findings would suggest that sleep outcomes may be influenced more by the type and intensity of exercise than by the phase of cancer treatment.

INTRODUCTION

Women with breast cancer are at elevated risk for sleep deficiency, defined as the discrepancy in sleep duration and/or quality obtained compared with the amount needed for optimal health.[1,2] Sleep deficiency can occur at the time of breast cancer diagnosis or during primary treatment[3,4] and can persist for years after cancer treatment is completed.[5–7] For example, in adults with various types of cancer diagnoses (N = 962) at perioperative baseline, findings revealed high rates of sleep deficiency at baseline (59%) that declined but remained pervasive even at 18 months postsurgery (36%).[7] Nearly half of the sample were women with breast cancer (49%), in which the sleep deficiency rates were the highest compared with other types of cancer (69% at baseline and 42% at 18 months).[7] Sleep deficiency can negatively affect health outcomes, including cognitive functioning,[8] quality of life,[5] immune function, and survival.[9,10] Among women with breast cancer, sleep problems may affect self-care and help-seeking behaviors, as well as adherence to recommended therapeutic interventions such as hormonal therapy.[11–13] Other consequences include fatigue, psychological distress, and impaired functioning.[14]

EXERCISE INTERVENTIONS FOR WOMEN WITH BREAST CANCER

Pharmacologic interventions have been shown to improve sleep deficiency in patients with chronic

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insomnia but may have adverse effects.[15] Cognitive behavioral therapy for insomnia has been effective in patients with cancer[16,17] but access to this therapy is often limited.[17] Physical activity and exercise, defined in **Box 1**,[18] are attractive options for managing sleep deficiency because of the favorable safety profile, availability, and positive impact on other health outcomes.[19,20] Proposed mechanisms by which exercise reduces sleep deficiency include improved body weight, fitness, mood, and positive effects on inflammation and circadian rhythms.[21–23] Yet, the question of whether exercise is effective in improving sleep in adults with cancer remains unanswered, particularly in breast cancer.

A recent systematic review of exercise interventions in adults with mixed cancers identified 21 trials, including 17 randomized controlled trials (RCT), involving more than 2077 patients with cancer who reported sleep quality as an endpoint.[24] Eight of the studies (38%) had sample sizes of 40 or less, 10 included only women with breast cancer (48%), and yoga was excluded as an exercise.[24] Although the overall findings suggest a beneficial effect of exercise interventions on sleep in several studies (48%), the meta-analysis for RCT studies showed no significant effect on subjective or objective sleep measures.[24] The investigators suggest that additional large, rigorous studies are needed to determine the type of exercise, timing, and dosage with the most benefit in patients with cancer, including subgroups such as women with breast cancer.[24]

Other reviews of exercise interventions on sleep outcomes during and after cancer treatments[25,26] included 20 trials with more than 1000 patients with cancer. Although the findings suggest that exercise has a modest beneficial effect on sleep quality during and after treatment, most of the trials were pilot studies with less than 100 participants who had various cancer diagnoses, or studies were focused on general quality of life outcomes. Other reviews have focused on exercise interventions in women with breast cancer only during adjuvant treatment[27] or in adults with hematological malignancies,[28] which limits the scope of the conclusions. Previous reviews have neither examined the impact of exercise on sleep in women with breast cancer across the phases of care, nor included exercise-based integrative interventions such as yoga, dance, qigong, and tai chi. A systematic review of the literature assessing the effect of exercise on sleep in women with breast cancer is needed to summarize the available evidence and to determine to what extent exercise is efficacious as a sleep-enhancing intervention.

Box 1
Definition of physical activity and exercise

Physical activity is body movement that is produced by the contraction of skeletal muscles, resulting in significantly increased energy expenditure.

Exercise is a subset of physical activity that is planned, structured, and repetitive. Its purpose is to improve or maintain at least one aspect of physical fitness (eg, muscular strength, muscular endurance, flexibility, cardiovascular endurance, body composition).

Data from Bernardo LM, Becker BJ. Exercise and physical activity for people living with cancer: nurses' edition. Pittsburgh (PA): Oncology Nursing Society; 2016.

OBJECTIVES

This article aims to (1) summarize and critically analyze current evidence regarding the effect of exercise on sleep deficiency in women with breast cancer at various phases of care, (2) identify gaps in this body of evidence, and (3) formulate recommendations for future research and adoption into practice.

METHODS

Eligibility Criteria

Preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines for the conduct of systematic reviews and meta-analyses were followed.[29] To be included, English language studies had to include at least 40 women with nonmetastatic breast cancer with an exercise intervention and sleep outcomes and at least 20 per group at randomization (**Table 1**). The authors included only women with stage 0-III breast cancer because advanced stage IV disease may affect a participant's adherence to exercise interventions and the study outcomes.[24] Past reviews of sleep outcomes excluded yoga due to heterogeneity of yoga types and variability in intensity[24]; however, new evidence suggests that exercise-based integrative interventions such as yoga and tai chi have an aerobic component.[30] For example, studies that compared posture-based yoga with conventional exercise indicated that physiologic benefits were similar to conventional cycling or brisk walking[31] and concluded that yoga was as efficacious as exercise in health-related outcomes in a variety of conditions.[31,32]