Fatigue in Breast Cancer Survivors: The Impact of a Mind-Body Medicine Intervention

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Purpose/Objectives: To evaluate a mind-body medicine (MBM) program for its impact on persistent fatigue following breast cancer treatment.

Design: Quasiexperimental.

Setting: An urban community hospital and a health department in a semirural county, both in Maryland.

Sample: 68 breast cancer survivors who were at least six months postadjuvant chemotherapy and/or radiation therapy and had a baseline fatigue score of 50 or lower per the vitality subscale of the SF-36® Health Survey.

Methods: A 10-week group-based MBM program for breast cancer survivors with persistent fatigue was evaluated using a pretest/post-test study design.

Main Research Variables: Sustained change in fatigue severity as measured by the Piper Fatigue Scale (PFS), SF-36 vitality subscale, and 10 cm visual analog scale (VAS).

Findings: Participants were 2.6 years post-treatment, with a mean age of 56.8 years. Overall, fatigue scores improved by 40%. The mean PFS improved from a score of 6 (SD = 1.6) at baseline to 4.2 (SD = 2) at the end of the program ($p < 0.001$), with additional improvement at two months and sustained at six months ($\bar{X} = 3.6$, SD = 2, $p < 0.001$). Results from the SF-36 and VAS also showed significant improvement in fatigue ($p < 0.001$).

Conclusions: The findings support the use of a holistic MBM intervention to reduce persistent fatigue in breast cancer survivors. Results should be confirmed with a randomized clinical trial.

Implications for Nursing: Nurses and other healthcare team members can effectively impact persistent fatigue in breast cancer survivors through the use of a multipronged MBM program.

Patients with breast cancer face the difficult task of recovery from the effects of treatment and adapting to life as cancer survivors. Fatigue is one of the most common lingering symptoms after breast cancer treatment, affecting as many as 40% of survivors, continuing for as long as a decade, and often hindering recovery (Andrykowski, Curran, & Lightner, 1998; Arndt, Merx, Stegmaier, Ziegler, & Brenner, 2005; Berglund, Bolund, Fornander, Rutqvist, & Sjödén, 1991; Bower et al., 2000, 2006; Fan et al., 2005; Jacobsen et al., 2007; Lindley, Vasa, Sawyer, & Winer, 1998; Meeske et al., 2007; Servaes, Gielissen, Verhagen, & Bleijenberg, 2007; Servaes, Verhagen, & Bleijenberg, 2002). Fatigue is a complex, multidimensional symptom with many contributing factors. Pain, sleep disturbance, depression, anxiety, decreased physical activity, cognitive problems, weight gain, and menopausal symptoms are associated with fatigue (Bennett, Goldstein, Lloyd, Davenport, & Hickie, 2004; Bower et al., 2000, 2006; Couzi, Helzlsouer, & Fetting, 1995; Jacobsen, Donovan, & Weitzner, 2003; Meeske et al., 2007; Nieboer et al., 2005; Servaes et al., 2002; Young & White, 2006), and overall quality of life worsens because of this persistent symptom (Alexander, Minton, Andrews, & Stone, 2009; Andrykowski et al., 1998; Arndt et al., 2005; Broeckel, Jacobsen, Horton, Balducci, & Lyman, 1998; So et al., 2009). With improvements in early detection and treatment options for breast cancer, the number of survivors has increased dramatically; currently, more than 2.6 million breast cancer survivors are living in the United States (Howlader et al., 2011). Several reports emphasize the need for additional research on long-term effects of cancer and its treatment, as well as how to assist patients in overcoming the challenges they face as they transition from active treatment to long-term survivorship (Hewitt, Greenfield, & Stoval, 2006; National Cancer Institute, 2004).

The multifaceted nature of post-treatment persistent fatigue calls for a multipronged approach; however, few studies have taken a multimodal approach to preventing or treating cancer-associated fatigue. Most intervention studies have examined the impact of exercise on fatigue (Cramp & Daniel, 2008; Duijts, Faber, Oldenburg, van Beurden, & Aaronson, 2011; McNeely et al., 2006; Velthuis, Agasi-Idenburg, Aufdemkampe, & Wittink, 2010). In addition, interventions to lessen

fatigue symptoms have primarily focused on acute fatigue during or shortly after completing adjuvant chemotherapy, whereas very little research has been conducted on interventions for patients with fatigue that persists six months or more beyond the initial treatment period.

Research focused on acute fatigue arising during chemotherapy or radiation therapy has provided the basis for developing comprehensive practice guidelines recommending exercise during the treatment period (Mock et al., 2001; National Cancer Institute, 2011; National Comprehensive Cancer Network, 2012; Oldervoll, Kaasa, Hjermstad, Lund, & Loge, 2004; Turner, Hayes, & Reul-Hirche, 2004). A recent meta-analysis identified 14 controlled exercise intervention studies, most within a relatively short time after treatment and examining fatigue as an outcome measure (Speck, Courneya, Mâsse, Duval, & Schmitz, 2010). Ninety-three percent of studies reported some improvement in fatigue, but only 50% noted statistically significant improvement; the effect size was both highly heterogeneous and inconsistent across the studies (Speck et al., 2010).

Several studies evaluated single interventions other than exercise for treatment of persistent fatigue in cancer survivors. Gielissen, Verhagen, Witjes, & Bleijenberg (2006) conducted a trial (intervention versus wait-listed control group) of cognitive behavioral therapy among cancer survivors with fatigue who were, on average, 4.6–5.5 years post-treatment. Thirty percent of patients on the trial had a diagnosis of breast cancer. Survivors in the intervention group received, on average, 12.5 counseling sessions, ranging from 5–26 sessions during a six-month period. Fatigue scores were assessed at baseline and six months. The intervention was associated with a statistically significant decrease in fatigue severity and psychological distress compared to the wait-listed group. One randomized, controlled trial (RCT) evaluated a 12-week yoga intervention for its impact on quality of life, including fatigue, among a multiethnic urban population of patients with breast cancer diagnosed within the past five years (Moadel et al., 2007). Emotional well-being and mood improved, but no change in reported fatigue was observed.

The literature on multimodality interventions is sparse. Rabin, Pinto, Dunsiger, Nash, and Trask (2009) conducted a pilot study using a combined telephone-based intervention of exercise and relaxation training for 23 breast cancer survivors who were, on average, 1.9 years postdiagnosis, and reported a significant improvement in fatigue as well as mood and sleep quality. One RCT evaluated the efficacy for preventing fatigue using two types of psychoeducational programs for breast cancer survivors who had recently ($\overline{X}$ = 5.5 months post-treatment) completed treatment (Stanton et al., 2005). Improvements in fatigue seen at six months following the intervention were not sustained at 12 months.

The goal of the proposed study was to design, implement, and evaluate a group-based mind-body intervention to reduce fatigue persisting at least six months beyond completion of adjuvant treatment experienced by breast cancer survivors. The program was modeled on a mind-body medicine program that has been used to treat many chronic health problems, including weight gain, pain, infertility, and cardiac

Session 1
- Overview of the program
- The mind body interaction and the relaxation response
- Nutrition and exercise
- Changing thoughts and attitudes to improve well-being

Session 2
- Cognitive restructuring and positive psychology to change thoughts and actions
- The relaxation response: Techniques to manage stress

Session 3
- Incorporating exercise into daily life: Strategies for success

Session 4
- Using positive psychology and spirituality to support health

Session 5
- The role of yoga in achieving mental and physical well-being

Session 6
- Improving nutrition to maximize health: Fine-tuning your diet for wellness

Session 7
- Review and expansion of exercise goals and strategies
- Health maintenance and disease prevention strategies for overall health
- Sleep disturbances and cognitive changes: Coping with after-treatment symptoms

Session 9
- Complementary and alternative therapies: Current knowledge, risks, and benefits

Session 10
- Review of goal achievement, completion of assessment tools, and plans for long-term success

Figure 1. Outline of Program Sessions

disease, all having both a stress component and the need to support self-care to improve health (Benson & Baim, 2003). The 10-week program incorporated a group cognitive-behavioral therapy approach with didactic sessions emphasizing relaxation and stress reduction techniques, nutrition, exercise, sleep disturbance, and symptom management. The study used a before-after design among breast cancer survivors who were at least six months postadjuvant chemotherapy or radiation therapy and who had fatigue in the disabling range.

Table 1. Baseline Sample Characteristics

Characteristic	n
Race	
Caucasian	49
African American	14
Hispanic	3
Asian	1
Other	1
Marital status	
Married	39
Single	11
Divorced	9
Widowed	8
Missing	1
Body mass index	
Lower than 25	12
25–30	22
Higher than 30	30
Missing	4
Smoking status	
Never	35
Former	26
Current	6
Missing	1
Tumor stage	
Tis	7
I	22
II	31
III	6
Missing	2
Tumor type	
Ductal	53
Ductal carcinoma in situ	7
Lobular	4
Mixed (lobular and ductal)	3
Missing	1
Estrogen receptor status	
Positive	49
Negative	15
Missing	4
Lymph node involvement	
Yes	26
No	42
Type of surgery	
Lumpectomy	31
Mastectomy	30
Missing	7
Adjuvant treatment	
Radiation only	5
Chemotherapy only	4
Hormone therapy only	5
Radiation and hormone therapy	12
Radiation and chemotherapy	6
Chemotherapy and hormone therapy	7
Radiation, chemotherapy, and hormone therapy	18
No adjuvant therapy	4
Missing	7

N = 68

Methods

Design and Sample

A quasiexperimental pretest/post-test study design compared baseline fatigue scores to fatigue measures at end of program, two months, and six months after completing the program. Impact on mood also was assessed as a secondary outcome. The study was approved by the institutional review boards of Mercy Medical Center in Baltimore and Washington County Hospital in Hagerstown, both in Maryland.

Adult women (aged 18 years and older) with stage I–III breast cancer diagnosed within the past five years and currently disease free, at least six months from completion of their adjuvant therapy for breast cancer (with the exception of hormone therapy or trastuzumab), and who had moderate to severe fatigue, as determined by a score of 50 or less on the vitality and fatigue subscale of the SF-36®, were eligible to participate in the pilot study. Prior to beginning the program, the Physical Activity Readiness Questionnaire (PAR-Q) physical activity screen (Thomas, Reading, & Shephard, 1992) was administered at baseline to determine the ability of participants to take part in the exercise session, and no restrictions of activity levels were identified. Fatigue and mood were assessed at baseline, the end of the intervention period, and two and six months postintervention.

A total of 68 women were recruited for the study. Seven women dropped out after attending only one or two sessions; therefore, 61 women were available for evaluation. The primary reason for participant dropout was conflicting employment demands. Sample size calculation was based on the published mean SF-36 vitality and fatigue subscale score of breast cancer survivors one to five years postdiagnosis, who were classified as disabled because of fatigue ($\bar{X}$ = 37, SD = 20) (Bower et al., 2000; Ware, Kosinski, & Keller, 1994), and a projected clinically significant 14-point improvement, representing an improvement out of the disabled range. Four groups with eight women per group (n = 32) were required to detect a 14-point pairwise mean change in fatigue scores with a two-sided alpha of 0.01 and power of 90%. Sample size was increased to account for potential drop outs and planned subgroup comparison by age and race (Caucasian or non-Caucasian).

Patients were recruited through letters sent to oncologists, flyers included with appointment reminder

Table 2. Fatigue and Mood Scale Scores at Four Time Points

	Baseline			End of Program			Two-Month Assessment			Six-Month Assessment			
Scales	$\bar{X}$	SD	p[a]	$\bar{X}$	SD	p	$\bar{X}$	SD	p	$\bar{X}$	SD	p	Trend
Piper Fatigue Scale[b]	6	1.6	Ref	4.2	2	< 0.001	3.6	1.9	< 0.001	3.6	1.8	< 0.001	< 0.001
SF-36® Energy and Vitality Subscale[c]	34	16.6	Ref	47.7	18.2	< 0.001	53.2	17.7	< 0.001	53.9	15.1	< 0.001	< 0.001
Fatigue VAS[d]	5.5	2	Ref	3.9	2	< 0.001	3.6	1.9	< 0.001	3.3	2	< 0.001	< 0.001
Mood VAS[d]	3.4	2	Ref	2.9	2	0.12	2.3	1.6	< 0.001	2.6	1.9	0.004	< 0.001

N = 61

[a] P value for the change from baseline within each group using pairwise comparison. The trend was assessed using generalized estimating equation analyses.

[b] High score equals high fatigue.

[c] High score equals higher energy and vitality.

[d] Scales range from 0 (no fatigue, good mood) to 10 (worse fatigue, bad mood).

Ref—reference category; VAS—visual analog scale

letters, signs and flyers in offices, and advertisements and announcements in advocacy and local publications from 2005–2007. The intervention was held at two sites, one in the urban community hospital setting and the other in a semirural county, both in Maryland. Programs were held during weekday afternoons, evenings, or Saturdays. As groups of 5–10 eligible women were recruited, informed consent was obtained and baseline questionnaires were mailed to participants. Participants were informed of the dates and times for the group sessions, and completed questionnaires were reviewed and collected at the first session. Outcomes were assessed through self-administered questionnaires at the final session, and subsequently two and six months following the final session.

Intervention

A 10-week group-based mind-body medicine intervention was developed and pilot tested to address the needs of patients with breast cancer. It consisted of 10 1.5–2 hour weekly group sessions with 5–10 breast cancer survivors per group (see Figure 1). Central to the program was a holistic approach to improve health and overall well-being by fostering self-care through stress-reduction techniques (e.g., mindful meditation, guided imagery, yoga), improved nutrition, and physical activity. Cognitive-behavioral approaches were employed to help individuals adopt and incorporate healthy behaviors and attitudes into daily life to reduce persistent fatigue. Additional didactic sessions on post-treatment symptoms (e.g., sleep, cognitive disturbances), long-term health maintenance, and use of complementary therapies were included. Each session began with practice of relaxation techniques, followed by a review of each individual's progress toward goals for nutrition, exercise, relaxation, and developing positive attitudes and behaviors to achieve new goals. The latter part of each session focused on the weekly didactic topic.

Core program faculty included a clinical social worker skilled in cognitive-behavioral therapy and group facilitation, a nurse practitioner with expertise in breast cancer survivorship care, and a medical oncologist who provided oversight and education. Core faculty completed the Clinical Training in Mind/Body Medicine program at the Harvard-affiliated Mind/Body Medicine Institute (Benson & Baim, 2003). A physical therapist with expertise in women's health and lymphedema and a yoga instructor participated in selected sessions.

Baseline data on overall health, physical activity, and nutrition were reviewed by the nurse practitioner, and individualized written plans for exercise and nutrition were developed and shared with each participant. Participants incorporated these plans when developing their wellness goals.

Measures

The primary outcome was change in fatigue levels from baseline to the end of the program, and subsequently at two and six months after program completion. Change in mood pretest/post-test intervention was a secondary outcome. Fatigue was assessed in three ways: **Piper Fatigue Scale (PFS)**, **10 cm visual analog scale (VAS)**, and the **vitality subscale of the SF-36**. The PFS, an instrument specifically designed for and evaluated among patients with breast cancer

(Piper et al., 1998), consists of 22 items and 4 subscales: behavioral/severity (6 items), affective meaning (5 items), sensory (5 items), and cognitive/mood (6 items). Standardized alpha is 0.97 for the entire scale and 0.89 for the subscales (Piper et al., 1998). The second measure of fatigue was a 10 cm VAS, ranging from 0 (no fatigue) to 10 (worst fatigue). A similar VAS compared to standard multidimensional fatigue scales correlated well, with sensitivity of 90% (Van Belle et al., 2005). The vitality subscale of the SF-36 was used as a third measure of fatigue. The documented reliability estimate of the vitality subscale of the SF-36 is 0.86 (Ware et al., 1994). Mood was assessed using a 10 cm VAS ranging from 0 (best mood) to 10 (worst mood).

Participants also completed a brief validated dietary assessment, the **PrimeScreen Questionnaire**, a 36-item symptom checklist assessment of usual hours of sleep and amount of physical activity (assessed as a five-category measure of moderate exercise in minutes per day ranging from none to more than 45) at baseline and follow-up visits (Rifas-Shiman et al., 2001).

Data Analysis

The study initially was designed to include a pilot period with qualitative assessment of sessions by the participants and modification of the intervention. After three pilot test groups, the intervention remained essentially unchanged, so all enrolled participants were combined in the analysis. Nine groups were conducted, with an average of seven patients per group. Outcomes were assessed immediately on completion of the intervention and then at two and six months following the intervention and compared to baseline scores.

Descriptive statistics for the sample were analyzed at baseline using Fisher's exact test and Student's t tests for categorical and continuous variables, respectively. Missing values were imputed with mean scores. Bivariate correlations among the fatigue measures also were explored. Paired t tests were used to compare mean scores at each follow-up time to baseline score. In addition, trends were assessed using generalized estimating equations (GEE), which estimate the overall effect of the intervention from baseline scores. Fatigue scores were analyzed as dependent variables separately in GEE analysis to include between-groups effects as well as within-subject effects over time (Horton & Lipsitz, 1999; Hu, Goldberg, Hedeker, Flay, & Pentz, 1998; Zeger, Liang, & Albert, 1988).

Covariates examined included age in years, race (non-Caucasian or Caucasian), years of education, chemotherapy status (prior chemotherapy or none), urban or rural location, hours of sleep, physical activity (dichotomized as greater or less than 15 minutes of moderate exercise per day), and PrimeScreen score (Rifas-Shiman et al., 2001). Changes in mood were analyzed similarly to fatigue scores. Stratified analyses were conducted by age (dividing by the median), race (Caucasian or non-Caucasian), and adjuvant treatment with chemotherapy (chemotherapy or none). All p values are two-sided. Analyses were performed using Stata®, version 9.1.

Results

Baseline characteristics of the study population are summarized in Table 1. Sixty-eight women entered the study, but seven dropped out after attending only 1 of the 10 weekly sessions and were not considered in the analyses. The mean age of participants was 56.3 years (SD = 9.8), most were Caucasian and married, and median years of education was 16 (SD = 8–10). Mean time since breast cancer diagnosis was 2.6 years, with a range of 0.7–10.5 years, and mean body mass index was 30. The majority (88%) had early-stage breast cancer (stage II or lower). About 51% had chemotherapy as part of their primary treatment. One patient was diagnosed with metastatic disease during the program but was maintained in the analysis.

The changes in the three measures of fatigue and mood are shown in Table 2 for the 61 participants who attended the full program. Improvement was noted by all three measures. Fatigue decreased and vitality and energy increased significantly from baseline to end of program, with additional improvement at the two-month assessment and sustained improvement at six months. Compared to baseline, fatigue symptoms decreased by 40% at the six-month follow-up after completion of the 10-week program ($p < 0.001$ for both PFS and VAS). SF-36 vitality subscale scores increased by 60%

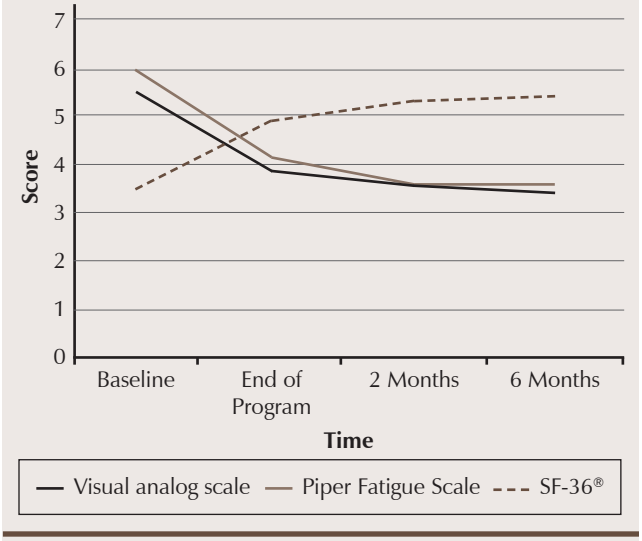

Figure 2. Mean Fatigue Scores From Baseline to Six-Month Follow-Up

Table 3. Changes in Fatigue Levels, Determined by Scale, Stratified by Age

Participant Age	SF-36® Energy/ Vitality Subscale[a] $\bar{X}$	SD	p[b]	Piper Fatigue Scale[a] $\bar{X}$	SD	p[b]	Fatigue VAS[a] $\bar{X}$	SD	p[b]
Younger than 56									
BL	31.3	16	Ref	6.5	1.2	Ref	5.6	1.7	Ref
EOP	47	16.3	< 0.001	4.5	2	< 0.001	4.1	2	0.003
2 months	51.2	15.6	< 0.001	4.1	1.8	< 0.001	4	1.9	< 0.001
6 months	54	13.9	< 0.001	4.1	1.6	< 0.001	3.6	2	< 0.001
Trend[c]		< 0.001			< 0.001			< 0.001	
56 and older									
BL	36.2	14	Ref	5.7	1.8	Ref	5.4	2.2	Ref
EOP	48.3	19.8	0.006	4	2	< 0.001	3.7	2	< 0.001
2 months	54.9	19.3	< 0.001	3.2	1.9	< 0.001	3.3	1.9	< 0.001
6 months	53.9	16.2	< 0.001	3.2	1.8	< 0.001	3.1	1.9	< 0.001
Trend[c]		< 0.001			< 0.001			< 0.001	

[a] SF-36 energy/vitality subscale: high score equals higher energy and vitality; Piper Fatigue Scale: high score equals high fatigue; fatigue VAS: 0 (no fatigue) to 10 (worse fatigue)

[b] P value for the change from baseline within each group using pair-wise comparison. The trend was assessed using generalized estimating equations analyses.

[c] Trend notes the overall effect of the intervention compared to baseline scores and is computed using generalized estimating equations.

BL—baseline; EOP—end of program; Ref—reference category; VAS—visual analog scale

Note. The reference category is the category of data to which all other time points (EOP, 2 months, and 6 months) are compared.

($p < 0.001$). Mood, as measured by the VAS, improved parallel to the decrease in fatigue symptoms, with a 24% sustained improvement at six months compared to baseline scores ($p = 0.004$).

The average visual analog fatigue scores showed a steady decline by week during the program. Figure 2 shows the average fatigue scores for the three measures of fatigue at baseline, end of program, and the two- and six-month follow-ups. A steady decrease was observed from week to week over the program, with a leveling off but sustained overall reduction in fatigue following the program without additional intervention at the two- and six-month assessment periods. Adjustments for covariates did not alter the results.

Table 3 displays changes in fatigue stratified by age, race, and whether the participant had chemotherapy as part of adjuvant treatment. Similar reduction in fatigue and improvement of mood and vitality were noted by age (dichotomy from median), race (Caucasian or non-Caucasian) (see Table 4), and chemotherapy status (see Table 5). In addition, reduction in fatigue was similar with education (high school or less versus more than high school) and urban or rural residence status.

Changes in physical activity, diet, and hours of sleep either did not change or only modestly improved. Although reported hours of sleep improved between the two- and six-month follow-up, no change occurred between baseline and the two-month follow-up visit, despite continued reduction in fatigue in the same time period. The R^2 only marginally improved with the addition of these factors

Table 4. Changes in Fatigue Levels, Determined by Scale, Stratified by Race

Participant Race	SF-36® Energy/ Vitality Subscale[a] $\bar{X}$	SD	p[b]	Piper Fatigue Scale[a] $\bar{X}$	SD	p[b]	Fatigue VAS[a] $\bar{X}$	SD	p[b]
Caucasian									
BL	34.3	17	Ref	5.8	1.4	Ref	5.5	2	Ref
EOP	48.8	18.3	< 0.001	4.2	2.1	< 0.001	3.8	2	< 0.001
2 months	52.9	19.5	< 0.001	3.6	2	< 0.001	3.4	2	< 0.001
6 months	53.7	16.8	< 0.001	3.6	1.9	< 0.001	3.3	2.2	< 0.001
Trend[c]		< 0.001			< 0.001			< 0.001	
Non-Caucasian									
BL	33.2	15.9	Ref	6.7	1.9	Ref	5.7	1.9	Ref
EOP	44.8	18.4	0.112	4.4	1.9	< 0.001	4	2.2	0.014
2 months	54.1	11.7	< 0.001	3.4	1.6	< 0.001	3.9	1.9	0.008
6 months	54.5	9.4	< 0.001	3.8	1.6	< 0.001	3.4	0.9	< 0.001
Trend[c]		< 0.001			< 0.001			< 0.001	

[a] SF-36 energy/vitality subscale: high score equals higher energy and vitality; Piper Fatigue Scale: high score equals high fatigue; fatigue VAS: 0 (no fatigue) to 10 (worse fatigue)

[b] P value for the change from baseline within each group using pairwise comparison. The trend was assessed using generalized estimating equations analyses.

[c] Trend notes the overall effect of the intervention compared to baseline scores and is computed using generalized estimating equations.

BL—baseline; EOP—end of program; Ref—reference category; VAS—visual analog scale

Note. The reference category is the category of data to which all other time points (EOP, 2 months, and 6 months) are compared.

to the model compared to the model with time only. The noted change in R^2 was only statistically significant (unadjusted R^2 = 0.18; adjusted R^2 = 0.31; p = 0.04) in the model using the PFS as the outcome variable.

Table 5. Changes in Fatigue Levels, Determined by Scale, Stratified by Treatment

	SF-36® Energy/ Vitality Subscale[a]			Piper Fatigue Scale[a]			Fatigue VAS[a]		
Treatment	$\bar{X}$	**SD**	**p[b]**	$\bar{X}$	**SD**	**p[b]**	$\bar{X}$	**SD**	**p[b]**
No chemotherapy									
BL	39.4	17.4	Ref	5.7	1.8	Ref	5.3	2.4	Ref
EOP	48.3	18.8	0.087	4	2	< 0.001	3.3	1.8	< 0.001
2 months	52.9	18.4	0.005	3.4	2	< 0.001	3.3	1.8	< 0.001
6 months	53.8	15.2	< 0.001	3.4	2	< 0.001	3.2	1.9	< 0.001
Trend[c]		< 0.001			< 0.001			< 0.001	
Chemotherapy									
BL	30	15	Ref	6.3	1.4	Ref	5.7	1.7	Ref
EOP	47.3	18	< 0.001	4.3	2.1	< 0.001	4.3	2.1	0.002
2 months	54.5	17.4	< 0.001	3.7	1.8	< 0.001	3.7	2.1	< 0.001
6 months	54	15.3	< 0.001	3.9	1.7	< 0.001	3.4	2	< 0.001
Trend[c]		< 0.001			< 0.001			< 0.001	

[a] SF-36 energy/vitality subscale: high score equals higher energy and vitality; Piper Fatigue Scale: high score equals high fatigue; fatigue VAS: 0 (no fatigue) to 10 (worse fatigue)

[b] P value for the change from baseline within each group using pairwise comparison. The trend was assessed using generalized estimating equations analyses.

[c] Trend notes the overall effect of the intervention compared to baseline scores and is computed using generalized estimating equations.

BL—baseline; EOP—end of program; Ref—reference category; VAS—visual analog scale

Note. The reference category is the category of data to which all other time points (EOP, 2 months, and 6 months) are compared.

Discussion

Among participants, the 10-week mind-body medicine program was associated with a 40% decrease in fatigue and a concomitant increase in energy and vitality that was sustained for six months without additional intervention. The improvement could not be specifically attributed to changes in physical activity, diet, or hours of sleep.

The quasiexperimental nature of the study prohibits making strong cause-and-effect inferences. However, participants were at least six months past their final adjuvant radiation or chemotherapy treatment and most were several years out from adjuvant treatment, with the exception of hormonal therapy. The possibility exists that participants would have had improvement in fatigue without this intervention. However, participants were women with persistent fatigue who had completed their primary adjuvant therapy, on average, almost three years previously; therefore, that they would have markedly improved during the 10-week period without additional intervention is unlikely. In addition, a waiting period existed between the time of screening for eligibility and the start of the intervention. Patients were assessed with the vitality subscale of the SF-36 at the eligibility assessment and again at the beginning of the group intervention. The median time between screening and intervention was 72 days. No change occurred in fatigue scores between the screening score and the baseline score at the time of initiation of the intervention, even for those with prolonged wait periods. These factors support that the change in fatigue was a result of the intervention. In addition, the steady week-to-week improvement and consistency in response across multiple measures of fatigue reassure that changes noted were real and not attributed to the method of assessment.

The current study examined a multiprong approach to fatigue reduction among those with chronic fatigue symptoms, which has not been evaluated extensively, making direct comparison to other study results difficult. The majority of studies that address cancer-associated fatigue have focused on one particular factor that may contribute to fatigue, such as diminished physical activity, with prescribed exercise regimens as the most common intervention (Cramp & Daniel, 2008; Duijts et al., 2011; McNeely et al., 2006; Speck et al., 2010; Velthuis et al., 2010). The major focus has been on fatigue occurring during or shortly after adjuvant chemotherapy. Studies of patients with breast cancer during or soon after treatment have evaluated selected interventions that were included on some level in the current multimodal program. A meta-analysis of 14 RCTs investigating the impact of a variety of behavioral interventions including group and individual counseling, yoga, and mindfulness-based stress reduction (MBSR) on fatigue in breast cancer survivors reported a significant positive impact on fatigue (standardized $\bar{X}$ difference = –0.158, 95% confidence interval [–0.233, –0.082], p < 0.001) (Duijts et al., 2011). However, most studies included in this analysis focused on acute fatigue during treatment or were interventions primarily designed to treat insomnia in patients with breast cancer or survivors. One randomized trial not included in the meta-analysis evaluated the impact of an MBSR intervention for 84 breast cancer survivors who were within 18 months post-treatment. Those in the intervention group had significant improvement in mood,

energy, and physical function compared to the usual care control group (Lengacher et al., 2009). Whether or not combining the exercise-focused interventions with a multifaceted mind-body medicine approach will result in greater reduction in fatigue should be evaluated.

The current study's multimodal group-based intervention was designed as a preliminary study to establish a program and examine its impact on symptom improvement over time, assessing not only at program completion, but also two and six months post-treatment. The fact that this group of relatively long-term breast cancer survivors who were, on average, 2.7 years post-treatment not only reported marked improvement in fatigue at end of program but realized sustained improvement six months later without additional intervention is encouraging.

This intervention shows promise for reducing symptoms of fatigue among breast cancer survivors presenting with persistent fatigue measured in the disability range. The sustained improvement in symptoms at six months, without additional intervention, suggests that a short-term program may lead to long-term benefit. The program should be evaluated in an RCT to confirm the efficacy of the intervention.

Implications for Practice

Nurses and other healthcare team members may be able to help breast cancer survivors reduce persistent fatigue through the use of a multipronged mind-body medicine program that focuses on stress reduction, cognitive behavioral techniques to achieve positive change, nutrition, and physical activity.

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