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Differences in Sleep Disturbance, Fatigue and Energy Levels Between Women With and Without Breast Pain Prior to Breast Cancer Surgery

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Abstract

The purpose of this study was to evaluate for differences in occurrence and severity ratings of sleep disturbance, fatigue, and decreased energy in women who reported breast pain prior to surgery for breast cancer. Of the 390 women who completed self-report measures for each symptom, 28.2% reported pain in their breast prior to surgery. A higher percentage of women in the pain group (i.e., 66.7% versus 53.5%) reported clinically meaningful levels of sleep disturbance. However, no between group differences were found in the severity of sleep disturbance, fatigue, or decreased energy. Findings from this study suggest that sleep disturbance, fatigue, and decreased levels of energy are significant problems for women prior to breast cancer surgery. Future studies need to evaluate for specific characteristics that place women at greater risk for these symptoms as well as the mechanisms that underlie these symptoms.

Keywords

pain; fatigue; energy; sleep disturbance; breast cancer; surgery

INTRODUCTION

While numerous studies have evaluated fatigue,¹⁻⁴ sleep disturbance,⁵⁻⁷ and pain^{1,8-10} in breast cancer patients during adjuvant treatment, studies on the occurrence and severity of sleep disturbance,¹¹⁻¹⁴ fatigue,^{12,15,16} and pain¹⁷⁻²⁰ prior to surgery are more limited. In studies of preoperative sleep disturbance,¹¹⁻¹⁴ between 36% and 88% of patients reported this symptom and 55% noted that their cancer diagnosis triggered the sleep disturbance.²¹ In a study of the association between preoperative levels of sleep disturbance and postoperative

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outcomes, patients with poorer sleep efficiency scores reported significantly higher levels of postoperative pain and greater pain interference with function.¹¹

Only three studies evaluated preoperative levels of fatigue.^{12,15,16} In one study,¹⁶ patients with higher levels of preoperative fatigue anticipated higher levels of postoperative fatigue. In addition, between 32.5%¹⁵ and 77%¹² of patients reported fatigue prior to breast cancer surgery. No studies have evaluated both the occurrence and severity of preoperative fatigue in breast cancer patients and its relationship to other symptoms.

Preoperative pain in the breast or arm was evaluated in only six studies.^{17-20,22} In one study,¹⁷ 10% of women reported preoperative pain in the ipsilateral arm. In a follow-up study of this sample,¹⁸ 30% of women reported preoperative breast pain. In another study,¹⁹ 87.8% of patients reported preoperative breast tenderness. Finally, two studies^{20,22} found that 28% of women reported preoperative breast pain. None of these studies evaluated the relationships between preoperative pain and sleep disturbance or fatigue.

Given the large number of women who undergo surgery for breast cancer, little is known about the occurrence of clinically meaningful levels of preoperative sleep disturbance, fatigue, and breast pain in women *prior* to surgery. In addition, no data are available on the impact of preoperative breast pain on sleep disturbance and fatigue. Given the paucity of research, the purposes of this study were to evaluate for differences in occurrence and severity of sleep disturbance and sleep interference, as well as fatigue and energy in patients with breast cancer who did and did not have preoperative breast pain.

METHODS

All of the study procedures are described in detail elsewhere.²²⁻²³ In brief, 410 breast cancer patients were recruited prior to surgery, signed an informed consent, and completed the enrollment questionnaires. Patients completed a demographic questionnaire, Karnofsky Performance Status (KPS) score,²⁴ and Self-Administered Comorbidity Questionnaire.²⁵ Medical records were reviewed for disease and treatment information.

Occurrence of preoperative breast pain was determined by asking “Are you experiencing pain in your affected breast?”. If yes, women rated the severity of their pain using 0 (no pain) to 10 (worst pain imaginable) numeric rating scales (NRS).²⁶ Women were asked how many days a week and how many hours a day they experienced significant pain.

General Sleep Disturbances Scale (GSDS) was used to evaluate overall sleep disturbance over the past week. GSDS total score that can range from 0 (no disturbance) to 147 (extreme sleep disturbance).^{5,23,27-29}

Sleep Interference Scale (SIS) evaluated the level of interference that sleep disturbance had on seven aspects of daily living. A mean interference score was calculated for the 7 items.

Lee Fatigue Scale (LFS) consists of 18 items designed to assess physical fatigue and energy.³⁰ Each item is rated on a 0 (not at all) to 10 (extremely) NRS. Total fatigue and energy scores were calculated as the mean of the 13 fatigue items and the 5 energy items, respectively. Higher scores indicate greater fatigue severity and higher levels of energy.

Descriptive statistics and frequency distributions were generated on sample characteristics and symptom severity scores. Clinically meaningful cutpoints for sleep disturbance (i.e., GSDS total score = 43), fatigue (i.e., LFS fatigue severity score = 4.4), and energy (i.e., LFS energy score = 4.8) were used to determine the occurrence rates for these symptoms.^{5,31} Women were categorized into breast pain (n=110; 28.2%) and no breast pain (n=280;

71.8%) groups. Differences in demographic and clinical characteristics between the pain and no pain groups were determined using parametric and nonparametric tests.

Based on these initial analyses, significant differences in age, KPS scores, menopausal status, and ethnicity were found between the two pain groups. Because differences in sleep disturbance and fatigue are associated with age,³²⁻³⁴ KPS scores,³⁵⁻³⁷ ethnicity,¹¹ and menopausal status,^{38,39} age and KPS score (as continuous variables) as well as ethnicity (white versus nonwhite) and menopausal status (yes/no; as dichotomous variables) were entered as covariates and pain group (as a dichotomous variable) was entered as a fixed factor in the univariate analyses of covariance that evaluated for differences in symptoms between women with and without breast pain. A p-value of <0.05 was considered statistically significant.

RESULTS

Differences in Demographic and Clinical Characteristics

Differences in demographic and clinical characteristics between women with and without preoperative breast pain are summarized in Tables 1 and 2, respectively. Women with preoperative breast pain were significantly younger and a significantly higher percentage was non-white. No differences in education, marital status, living arrangements, employment status, and income were found between the two pain groups.

No significant differences were found in the majority of clinical characteristics between the two pain groups. Significantly fewer women with breast pain had gone through menopause. Women with breast pain reported a significantly lower mean KPS score and had significantly more biopsies in the previous year.

A complete description of the pain problem is reported elsewhere.²² In brief, among the women with preoperative breast pain, the mean worst and average pain scores were 3.6 ± 2.4 and 2.2 ± 2.1 , respectively. These women had significant pain an average of 6.2 ± 7.9 hours per day on 2.9 ± 2.8 days per week.

Differences in Symptom Occurrence Rates

As shown in Figure 1, a significantly higher percentage of patients with breast pain (66.7%) had a total GSDS score of ≥ 43 than patients without breast pain (53.5%, $p=.02$). No between group differences were found in the percentage of patients who reported clinically meaningful levels of fatigue (≥ 4.4) or decrements in energy (≥ 4.8).

Differences in Sleep Parameters

After controlling for significant covariates, no differences were found in any subscale or the total GSDS scores between the two pain groups (Supplemental Figure 1). Except for the interference with sexual activity item, no differences were found in any individual item or total sleep interference scores (Supplemental Figure 2). Women without breast pain reported significantly higher sleep interference scores with sexual activity.

Differences in Fatigue and Energy Scores

After controlling for significant covariates, no differences were found in fatigue and energy scores between the two pain groups (Supplemental Figure 3).

DISCUSSION

This study is the first to evaluate the effects of preoperative breast pain on sleep disturbance, fatigue, and energy levels in a large sample of breast cancer patients. While the occurrence of clinically meaningful levels of sleep disturbance was significantly higher in the pain group, 53.5% of women in the no pain group reported sleep disturbance. This finding is consistent with previous reports^{12,13} and suggests that preoperative sleep disturbance is a common problem in these patients. In contrast, the occurrence rates for clinically meaningful levels of fatigue and decreased energy were similar between the two groups. Consistent with one study,¹⁵ but lower than occurrence rates reported in another study,¹² 32% of the sample reported fatigue. Taken together, the high rates of sleep disturbance and fatigue suggest that regardless of preoperative pain, a substantial percentage of women experience clinically meaningful levels of these symptoms prior to surgery.

No studies have evaluated preoperative energy levels in breast cancer patients. While the concept of energy may appear to be the inverse of fatigue, it is a unique concept. Energy was assessed with LFS items that evaluated levels of activity, feeling lively, and efficiency. In comparison, the questions that assessed fatigue included ratings of exhaustion and difficulty concentrating. The hypothesis that diminished energy is a distinct concept is further supported by the fact that while 32% of the patients reported clinically meaningful levels of fatigue almost 50% of the patients reported clinically meaningful decrements in energy.

No differences were found, between women with and without breast pain, in any GSDS subscale or total scores. However, except for the “use of sleep medications” subscale, scores on the other six GSDS subscales ranged from 2.1 to 4.8. These scores are interpreted as the number of days per week a patient experiences a particular problem and a score of 3 indicates a clinically meaningful problem. Women in this study experienced problems with sleep quality, quantity, mid-sleep awakenings, and early awakenings on three or more days per week, which suggests a problem with sleep maintenance. In addition, the very low scores on the use of sleep medications subscale suggests that women are not prescribed or are not taking medications to alleviate sleep disturbance.

This study is the first to report sleep interference scores in women prior to surgery for breast cancer. With the exception of sexual activity, pain group membership did not influence sleep interference scores. The individual item and total SIS scores ranged from 1.4 to 3.7. These findings suggest that on average these women had mild to moderate levels of sleep interference. Finally, women without breast pain reported that their level of sleep disturbance interfered more often with their sexual activity than women with breast pain. While no studies were found on the impact of sleep disturbance on sexual activity in women with breast cancer, in women with fibromyalgia sleep disturbance and/or pain may diminish sexual activity.⁴⁰ Additional research is warranted on the impact of sleep disturbance on patients’ ability to function.

Several study limitations need to be acknowledged. Sleep disturbance was assessed using only a subjective measure. Future studies need to evaluate both objective and subjective measures and evaluate for the existence of a sleep problem prior to the diagnosis of breast cancer. In addition, one of the major reasons for refusal was being overwhelmed with the cancer experience. Therefore, this study may underestimate the occurrence and severity of preoperative sleep disturbance and fatigue, as well as psychosocial characteristics (e.g., stress associated with the diagnosis of cancer, anxiety associated with impending surgery) in these women. Finally, since the majority of the sample was well educated, findings cannot be generalized to individuals with lower levels of education.

Despite these limitations, findings from this study suggest that sleep disturbance, fatigue, and decreased levels of energy are significant problems for women prior to breast cancer surgery. Future studies need to evaluate for specific characteristics that place women at greater risk for these symptoms. In addition, future studies need to determine the mechanisms that underlie sleep disturbance, increased fatigue, decreased energy, and breast pain prior to surgery, as well as evaluate for changes in these symptoms over time. This type of detailed characterization of these symptoms in women prior to and during treatment for breast cancer will facilitate the development and testing of interventions to relieve these symptoms.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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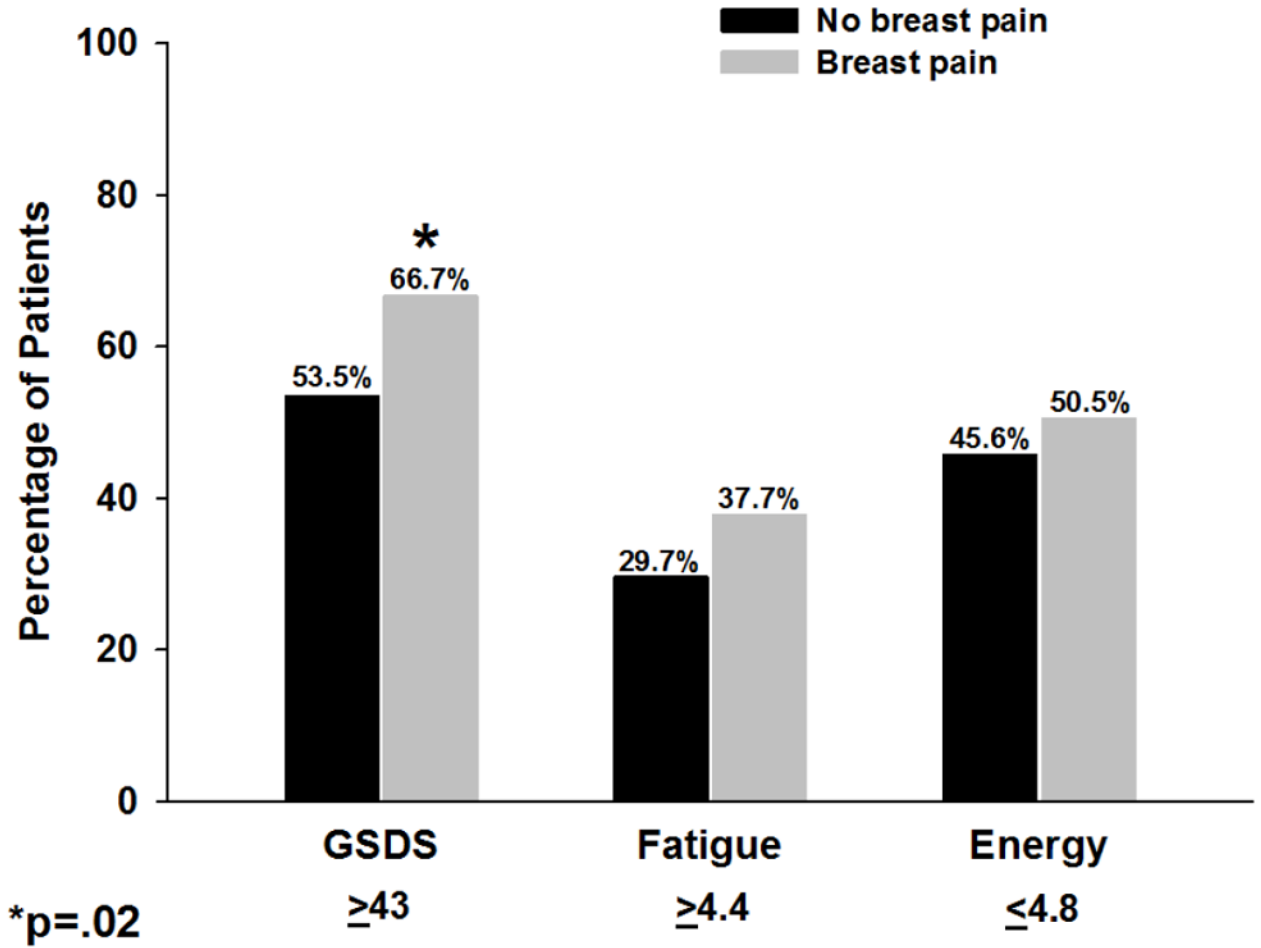


Figure 1. Differences in occurrence rates for sleep disturbance (i.e., General Sleep Disturbance Scale ≥ 43), fatigue (i.e., Lee Fatigue Scale (LFS) Score ≥ 4.4), and decreased levels of energy (i.e., Energy subscale of LFS ≤ 4.8) by pain group. All values are plotted as percentages by pain group.

Table 1

Differences in demographic characteristics between women with (n=110) and without (n=280) breast pain prior to breast cancer surgery

Characteristic		No Breast Pain 71.8% (n=280) Mean (SD)	Breast Pain 28.2% (n=110) Mean (SD)	Statistics
Age (years)		56.5 (11.8)	50.9 (9.8)	t=4.81, p<0.0001
Education (years)		15.8 (2.7)	15.4 (2.6)	n.s.
		% (n)	% (n)	
Ethnicity	Non-white	31.9 (89)	45.0 (49)	F.E.=0.018
Marital status	Married	41.9 (117)	43.0 (46)	n.s.
Lives alone		24.1 (67)	25.2 (27)	n.s.
Works for pay		48.4 (134)	50.0 (55)	n.s.
Annual income	<\$30,000	12.6 (29)	25.3 (23)	n.s.
	\$30,000-\$99,999	47.4 (109)	40.7 (37)	
	≥\$100,000	40.0 (92)	34.1 (31)	

n.s. = not significant

Table 2

Differences in clinical characteristics between women with (n=110) and without (n=280) breast pain prior to breast cancer surgery

Characteristic	No Breast Pain 71.8% (n=280) Mean (SD)	Breast Pain 28.2% (n=110) Mean (SD)	Statistics
Body mass index (kg/m ²)	27.0 (6.3)	26.1 (5.7)	n.s.
Karnofsky performance status score	94.0 (10.3)	90.9 (10.1)	t=2.66, p=0.008
Self-administered comorbidity questionnaire score	4.3 (2.8)	4.2 (3.1)	n.s.
Number of biopsies in the last year	1.5 (0.8)	1.6 (0.8)	U= 12887.0, p=0.006
	% (n)	% (n)	
Stage of Disease	Stage 0	17.7 (47)	16.0 (17)
	Stage I	39.6 (105)	31.1(33)
	Stage IIA/IIB	34.7 (92)	40.6 (43)
	Stage IIIA-IV	7.9 (21)	12.3 (13)
			n.s.
Mastitis	11.6 (32)	14.0 (15)	n.s.
Fibrocystic or cystic breast disease	17.8 (48)	22.9 (24)	n.s.
Non-cancer surgery on the affected breast	10.0 (28)	12.7 (14)	n.s.
Non-cancer surgery on the affected arm	4.3 (12)	1.8 (2)	n.s.
Non-cancer surgery on the affected hand	5.0 (14)	6.4 (7)	n.s.
Injury on the affected arm	15.0 (42)	14.5 (16)	n.s.
Injury on the affected hand	9.6 (27)	10.9 (12)	n.s.
Gone through menopause	67.9 (186)	53.8 (57)	F.E.=0.012
Received neoadjuvant therapy	21.1 (59)	17.3 (19)	n.s.

kg/m² = kilograms/meter squared; n.s. = not significant