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Exercise and Dietary Change after Diagnosis and Cancer-related Symptoms in Long-term Survivors of Breast Cancer: CALGB 79804

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Abstract

Objective—Improving diet and exercise can reduce survivors' risk of cancer-related fatigue, poor physical functioning, and potentially recurrence. A cancer diagnosis can represent a “teachable moment,” leading survivors to make positive changes in diet and exercise behaviors; however, little is known about how often this occurs or about factors that enhance or limit survivors' ability to make these changes. This cross-sectional descriptive study investigated both the prevalence and clustering of self-reported changes in diet and exercise and how these changes related to ongoing cancer-related symptoms, social support, and stressful life events among long-term breast cancer survivors.

Methods—Survivors (n=227, response rate=72%) of a prior Cancer and Leukemia Group B treatment trial, on average 12 years post-diagnosis, completed a mailed survey assessing health behavior changes since diagnosis and current symptoms, social support, and stressful life events.

Results—Over half of survivors reported making positive exercise or diet changes since diagnosis: over 25% reported making exercise and diet changes. ANCOVA models showed that survivors who reported increasing their exercise also reported lower fatigue. Trends were also found between increased fruit and vegetable intake and decreased fatigue and between increased exercise and increased social support.

Conclusions—These results underscore the need for health promotion efforts among survivors. Exercise promotion is especially needed since more survivors attempted to change dietary behaviors than exercise on their own. Further, fatigue may limit survivors' ability to change their health behaviors; alternatively, survivors who increase their exercise may experience less fatigue.

Keywords

Cancer; Oncology; Health behaviors; Survivors; Long-term effects

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Some of these results were presented at the Cancer Survivorship: Embracing the Future conference held in Washington, DC, October, 2006.

Introduction

Over 2.3 million breast cancer survivors in the United States live with increased risk for recurrence and second cancers, as well as cardiovascular disease, and many potentially debilitating symptoms including fatigue, decreased physical functioning, and decreased health-related quality of life (HRQOL)(Committee on Cancer Survivorship: Improving Care and Quality of Life, 2006). Thus it is imperative to identify strategies for reducing the risk of these problematic long-term effects of cancer and treatment.

Improving the diet and exercise behaviors of cancer survivors is one promising strategy. Recent reviews of the literature in survivors have shown that lifestyle changes have the potential to improve fatigue, physical functioning, and HRQOL (Jones & Demark-Wahnefried, 2006; McNeely et al., 2006; McTiernan, 2004; Schmitz et al., 2005) and decrease risk of recurrence (M. D. Holmes, Chen, Feskanich, Kroenke, & Colditz, 2005; Jones & Demark-Wahnefried, 2006; Meyerhardt et al., 2006).

A cancer diagnosis can represent a “teachable moment,” leading survivors to make positive changes in diet and exercise behaviors (Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005); however, reports differ on the number of survivors who make these changes (Demark-Wahnefried, Pinto, & Gritz, 2006; Pinto & Trunzo, 2005). It is not clear how these changes cluster together; e.g., if survivors attempt to change “everything” or focus on a specific behavior to change, or if positive or negative changes in health behaviors relate to ongoing cancer-related symptoms, stress, or social support. Healthy behaviors may improve symptoms and stress; however, problematic levels of symptoms, stressful life events, and poor social support may limit the opportunity to make positive exercise and dietary changes.

Little is known about these issues especially among long-term cancer survivors; thus, this study sought to investigate (1) the prevalence and clustering of self-reported changes in diet and exercise; and (2) how changes in these behaviors may relate to ongoing cancer-related symptoms, social support, and stressful life events among long-term breast cancer survivors.

Methods

Participants

Participants were recruited into the current study (Cancer and Leukemia Group B (CALGB) 79804) from among the 1,572 breast cancer survivors who had participated in a chemotherapy treatment trial (CALGB 8541(Wood et al., 1994)) from 1985-1991. At study start, 314 women were alive and disease-free and had approval from their physician to participate; 245 (78%) returned the surveys. Participants did not differ from CALGB 8541 survivors who did not participate except that more whites versus non-whites chose to participate ($p<0.0001$). Of the 245 participants who completed surveys, 227 participants (93%) provided data on changes in health behaviors and were included in the analyses presented here.

Procedures

CALGB 79804 was approved by the Institutional Review Board of each participating institution. Patient registration and data collection were managed by the CALGB Statistical Center. The patient's address, phone number, and disease status (alive and disease-free) were confirmed and the study treating physician was contacted for permission to approach the patient. A consent form and questionnaire were mailed to each eligible participant, with a postage-paid return envelope. Non-respondents were contacted by phone, and, if necessary, the survey was conducted by phone ($n=8$).

Measures

Health Behaviors were assessed by asking participants “Since your breast cancer diagnosis, have you done any of the following?” Follow-up questions then asked survivors to report increases or decreases in their “exercise habits” and dietary intake (fat, fiber, fruits and vegetables). Each was dichotomized indicating change in the direction of better health (e.g., higher exercise, lower fat) vs. no change or change not reflecting better health.

Symptoms—Fatigue was measured with the vitality subscale of the *Medical Outcomes Study* SF-36 health status measure (Ware J.E. Jr., 1996). Since the vitality subscale is coded 0-100 with increasing scores indicating greater vitality, the direction of fatigue is coded as the reverse: lower scores represent greater fatigue. Depression symptoms during the past week were measured with the *CES-D* 20-item short form total score (Radloff, 1977), with higher scores indicating worse depression symptomology. Fear of Recurrence was assessed with a modified form of the *Breast Cancer Anxiety and Screening Behavior Scale*, a 21-item reliable and valid scale that assessed the intrusive and avoidant thoughts related to breast cancer (Kash, 1995). We used 14 of the items relevant to breast cancer survivors, omitting 7 items relevant only to high-risk women or to breast cancer screening. Higher scores indicated more frequent symptoms. Satisfaction with Sexual Functioning was assessed with the Sexual Satisfaction scale of the *Watts Sexual Functioning Questionnaire* (Watts, 1982) where higher scores indicated worse sexual satisfaction. Body Satisfaction was assessed with the summed 10-item *Self-Concept Scale*, which assessed the participants' satisfaction with different body areas and their weight (Polivy, 1977) where higher scores indicated greater body satisfaction.

Social Support was measured with the 20-item *MOS Social Support Survey* (Sherbourne & Stewart, 1991) total score where higher scores indicated greater perceived social support.

Stressful life events were assessed with the 11-item *Life Events Scale* (Wilcox et al., 2003), adapted from the Social Readjustment Rating Scale (T. H. Holmes & Rahe, 1967) to measure the occurrence of a variety of potentially stressful life events, as well as the perceived emotional impact of the event. Higher scores on this scale represented a worse burden of stressful life events.

Demographic and Clinical Variables were obtained from the CALGB 8541 database, including demographics; date of study entry into CALGB 8541 and original treatment arm; menopausal status; performance status (Karnofsky); number of positive nodes at diagnosis; and tumor size, histological grade, and estrogen receptor status. Table 1 shows the demographic and clinical characteristics of the 227 participants included in these analyses.

Overview of Analysis

For this exploratory analysis, descriptive statistics were used to describe participants' characteristics, overall health behavior changes, and the numbers of survivors who changed specific groups of health behaviors. ANCOVA models adjusting for age, race, education, menopausal status, relationship status, surgery type, radiation therapy, CALGB 8541 treatment arm, and time since diagnosis were used to generate adjusted means on cancer-related symptoms, social support, and stress variables by each dichotomous health behavior change variable. Statistical analyses were performed by statisticians at the CALGB Statistical Center (JEH, JMD, & KD).

Results

Reported Changes in Health Behaviors after Breast Cancer Diagnosis

Overall, 58% of these long-term breast cancer survivors reported making positive changes in exercise and/or dietary intake since their diagnosis. Nearly 32% of the survivors reported increasing their exercise, 44% reported decreasing their fat intake, 42% reported increasing their fiber intake, and 43% reported increasing their consumption of fruits and vegetables. Approximately 5% of survivors reported increasing their exercise without making dietary changes and 26.5% of survivors reported making at least one positive dietary change without changing their exercise behavior. Some participants reported making multiple behavior changes: 26.5% reported making positive changes in their exercise and at least one diet behavior, with 18.5% reporting making positive changes in exercise and all three dietary behaviors.

Associations between Symptom, Social Support, and Stress Scores and Changes in Health Behaviors

Table 2 presents the adjusted mean cancer-related symptom scores for survivors who did vs. did not positively change their exercise or dietary intake. Survivors who reported increasing their exercise since diagnosis with breast cancer reported less fatigue (e.g., greater vitality scores) compared to those women who reported decreasing or maintaining their pre-diagnosis exercise level (65.2 vs. 58.7, respectively; $p = .03$). There was a similar trend toward less fatigue among women who reported increasing their fruit and vegetable intake, compared to women who reported decreasing or maintaining their pre-diagnosis dietary patterns (62.9 vs. 58.0, respectively; $p = .08$). There were no other differences in symptoms.

Table 2 also presents the adjusted mean social support and stressful life events scores for survivors who did vs. did not positively change their exercise or dietary intake. There was a trend for survivors who reported increasing their exercise after breast cancer diagnosis to report greater social support than survivors who reported decreasing or maintaining their pre-diagnosis level (78.9 vs. 73.1, respectively; $p = .06$). There were no differences in social support between survivors who did and did not change their dietary intake. Stressful life events scores did not differ by any exercise or diet change group.

More survivors treated with the intensive-dose chemotherapy regimen in the original treatment trial (CALGB 8541) reported an increase in their exercise behavior compared to those treated with the low-dose chemotherapy regimen ($p = .05$; data not shown). There were no other differences in health behavior changes by original CALGB treatment arm.

Discussion

This study sought to determine the prevalence and clustering of self-reported diet and exercise changes in long-term breast cancer survivors. Over half of long-term survivors in this study reported making positive exercise or diet changes since diagnosis. While encouraging, there is still a definite need for health promotion efforts. These results underscore the need for targeting diet and exercise among survivors to improve cancer-related symptoms and HRQOL, and reduce the risk for breast cancer recurrence, second cancers, mortality, and comorbid conditions.

Health promotion efforts should capitalize on a cancer diagnosis as a “teachable moment” to change health behaviors (Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005). Some survivors are interested in changing both exercise and diet, since over 25% of survivors in this study attempted to make both of these changes on their own. However, survivors may

need more assistance changing their exercise behaviors, since this study found that they were less likely to try this on their own.

A second purpose of this study was to evaluate how positive or negative changes in exercise and diet behaviors may relate to ongoing cancer-related symptoms, social support, and stressful life events. In this study, women who reported increasing their exercise behavior also reported lower fatigue. Given the cross-sectional relationship, it is not clear whether survivors who increased their exercise experienced decreased fatigue, as is commonly found in intervention studies, (e.g.(McNeely et al., 2006)), or whether survivors with significant fatigue found it impossible to increase their exercise. Additional evidence for the latter comes from the similar trend found in the current study between decreased fatigue among survivors who increased their fruit and vegetable intake. This may indicate a subgroup of fatigued women in need of assistance implementing health behavior changes in a well-paced manner so that they do not exacerbate their fatigue by trying to change too much too fast.

In contrast to the fatigue results, there were no associations between changing diet behaviors and other cancer-symptoms. This study found a trend toward a relationship between increased social support and increasing exercise. While it may be that exercise improves social support through socializing while exercising, it is more likely that social support for exercise and managing life demands makes it more likely that women can make positive changes in exercise. It is likely that women need support through the process of making these changes, and help with problem-solving ways to meet the demands of their lives while successfully changing their exercise and diet behaviors.

No association was found between stressful life events and health behavior changes. The low mean score on the stressful life events scale found in this study means that on average, participants experienced one very stressful event in the past year. It may be that a relationship between stressful life events and changing health behaviors would have been detected with a wider variation in stressful life event scores.

Weaknesses of this study include its cross-sectional design, small predominately white, married sample, self-reported diet and exercise changes using a non-validated scale, and lack of information on weight which may affect behavior change. Also not known are the initial (pre-cancer) levels of participants' health behaviors or whether they changed their exercise and diet by a clinically meaningful amount. Future studies should investigate these relationships using a prospective design with objective measurements of behavior change. Despite these weaknesses, these results have important implications for future intervention studies, given the paucity of research conducted with long-term survivors. Such interventions have the potential to make a substantial public health impact for the over 2.3 million breast cancer survivors in the US through improvements in both the quality and the quantity of life.

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Table 1Demographic and Clinical Characteristics of the Study Participants (N=227) ¹.

Characteristic	Participants	
	n	%
Age (years) ²		
30 – 49	22	9%
50 – 59	74	33%
60 – 69	82	36%
70 +	49	22%
Mean (SD) Range	61.9 (9.9)	34 – 84
Race		
White	212	93%
Other	15	7%
Education		
0 – 12 years	120	53%
13 – 16 years	83	36%
17 – 20 years	24	11%
Income		
Under \$20,000	39	17%
\$20,000 - \$44,999	65	29%
\$45,000 - \$79,999	49	22%
\$80,000 +	41	18%
Relationship Status		
Single	13	6%
Married/Living as married	155	68%
Separated/Divorced/Widowed	58	26%
Type of Surgery		
Mastectomy	178	78%
Breast Conservation Estrogen	49	22%
Estrogen Receptor Status		
Negative	70	31%
Positive	149	66%
Unknown	5	2%
Radiation Therapy		
No	176	78%
Yes	51	22%
CALGB 8541 Treatment Arm		
Low Dose	69	30%

Characteristic	Participants	
	n	%
Standard Dose	87	38%
Intensive Dose	71	31%
Menopausal Status		
In Menopause	208	92%
Not in Menopause	19	8%
	Mean (SD)	Range
Years since Diagnosis	12.4 (1.8)	9.4 – 16.5
Cancer-Related Symptoms³		
Fatigue	60.4 (21.3)	0 - 100
Depression symptoms	9.6 (8.6)	0 – 51
Anxiety about breast cancer	11.2 (6.4)	0 – 33.6
Sexual satisfaction	5.8 (1.9)	3 - 11
Body satisfaction	25.8 (7.5)	8 - 40
Stressful Life Events	4.9 (4.6)	0 – 28
Social Support	79.7 (21.1)	5.3 - 100

¹Frequencies within income, relationship status, and estrogen receptor status columns do not sum to 227 due to missing data. In particular, 15% of participants were missing data for income.

²Age at the time of interview

³N ranged from 217-227 except for sexual satisfaction (N=102)

Table 2
Mean Symptom, Social Support, and Stress Scores by Health Behavior Change Category.

Health Behavior	Cancer-related Symptom Score Mean ^{1,2}					Social Support Mean ^{1,2}	Stress Mean ^{1,2}
	Vitality/Fatigue (n=226)	Depression Symptoms (n = 225)	Anxiety about breast cancer (n = 216)	Sexual satisfaction (n = 101)	Body satisfaction (n = 224)		
Exercise							
Increased (n=72)	65.2 ^a	9.9	0.98	5.1	26.0	78.9 ^c	5.3
Decreased or no change (n=155)	58.7 ^b	11.9	1.03	5.5	25.1	73.1 ^d	5.8
Diet – Fat Intake							
Decreased (n=100)	62.0	11.0	1.03	5.6	25.1	75.0	5.8
Increased or no change (n=127)	58.6	11.9	1.01	5.0	25.4	73.7	5.7
Diet – Fiber Intake							
Increased (n=96)	60.6	11.8	1.05	5.5	25.1	74.3	5.4
Decreased or no change (n=131)	59.6	11.2	1.00	5.2	25.4	74.3	6.0
Diet – Fruit & Vegetable intake							
Increased (n=98)	62.9 ^c	11.4	1.05	5.5	25.4	73.1	5.4
Decreased or no change (n=129)	58.0 ^d	11.6	1.00	5.3	25.2	75.1	5.9

¹ (a-b) Means that do not share a common superscript are significantly different from each other at p < .05. (c-d) Means w/o common superscript are borderline significantly different from each other at p < .10

² ANCOVA models adjust for demographic and clinical variables from Table 1 (excluding Estrogen Receptor Status and Income).