Original Article

Real-World Experiences With Yoga on Cancer-Related Symptoms in Women With Breast Cancer

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Abstract

Purpose: Integrative therapies such as yoga are potential treatments for many psychological and physical symptoms that occur during and/or after treatment for cancer. The purpose of the current study was to evaluate the patient-perceived benefit of yoga for symptoms commonly experienced by breast cancer survivors.

Methods: 1,049 breast cancer survivors who had self-reported use of yoga on a follow up survey, in an ongoing prospective Mayo Clinic Breast Disease Registry (MCBDR), received an additional mailed yoga-focused survey asking about the impact of yoga on a variety of symptoms. Differences between pre- and post- scores were assessed using Wilcoxon Signed Rank Test.

Results: 802/1,049 (76%) of women who were approached to participate, consented and returned the survey. 507/802 (63%) reported use of yoga during and/or after their cancer diagnosis. The vast majority of respondents (89.4%) reported some symptomatic benefit from yoga. The most common symptoms that prompted the use of yoga were breast/chest wall pain, lymphedema, and anxiety. Only 9% of patients reported that they had been referred to yoga by a medical professional. While the greatest symptom improvement was reported with breast/chest wall pain and anxiety, significant improvement was also perceived in joint pain, muscle pain, fatigue, headache, quality of life, hot flashes, nausea/vomiting, depression, insomnia, lymphedema, and peripheral neuropathy, (all p-values <0.004).

Conclusion: Data supporting the use of yoga for symptom management after cancer are limited and typically focus on mental health. In this study, users of yoga often reported physical benefits as well as mental health benefits. Further prospective studies investigating the efficacy of yoga in survivorship are warranted.

Keywords

breast cancer, survivorship, yoga, symptom control, complementary and alternative medicine

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Introduction

Cancer survivors are at risk for a multitude of psychological and physical sequelae of the cancer experience. Survivorship guilt, fear of recurrence, and financial strain can cause depression and anxiety.[1,2] Physical side effects can include pain, fatigue, hot flashes, nausea/vomiting, insomnia, lymphedema, and peripheral neuropathy. Alternative modalities of therapy are popular amongst patients aiming to reduce the toxicities of surgery, chemotherapy, endocrine therapy, and radiation.

The Society of Integrative Oncology has created Evidence- Based Clinical Practice Guidelines for

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Integrative Oncology, including a grade 1B recommendation to use mind-body modalities as part of a multidisciplinary approach to reduce anxiety, mood disturbance, and chronic pain, in addition to improving quality of life.[3] Examples of mind-body modalities include meditation, yoga, tai-chi, hypnosis, music therapy, and other expressive art therapy. However, there is limited recent research on the impact of yoga on psychological and physical symptoms that cancer survivors experience with modern oncologic therapies. A randomized clinical trial completed in 2007 in women with new or recurrent breast cancer reported that the control group had a greater decrease in social well-being than did patients who participated in a 12-week yoga intervention.[4] Additionally, greater improvements were seen in patients who were not actively receiving chemotherapy during the yoga intervention period. Some of the response parameters included emotional well-being, social well-being, spiritual well-being, and distressed mood. Lower adherence to yoga was seen in patients that had ongoing radiation therapy, fatigue, younger age, and with patients who were not receiving antiestrogen therapy.[4] A systematic review, conducted in 2015, demonstrated low- to moderate-certainty evidence that yoga in non-cancer patients results in small to moderate improvements in back-related function at three and six months. Back-related function was measured by disability questionnaires that help clinicians assess how low-back pain affects a patient's daily function and activities.[5]

A review, published in 2018, summarized research studies focusing on integrative medicine modalities in cancer survivors.[6] In the category of mind-body modalities, a majority of the reviewed studies focused on Mind Body Stress Reduction (MBSR), a mind-body therapy utilizing group yoga, meditation exercises, and discussions about stress and coping, provided by trained instructors. Clinical trials and small randomized trials support that MBSR improves anxiety, fear of recurrence, and fatigue; however, quality of life, pain, and depression measures were not clearly impacted.[6] An additional review of Phase I and II clinical trials evaluating the use of low-intensity forms of yoga has demonstrated that this type of intervention is safe and effective for treating cancer-related symptoms such as fatigue, psychosocial distress, and musculoskeletal symptoms.[7]

The current project aimed to add to the literature on yoga in survivors by studying the patient perspective regarding how specific symptoms responded to yoga after breast cancer treatment, and the magnitude of benefit yoga may provide. Yoga can be time-consuming and costly, potentially compounding the financial difficulties of cancer treatment, so it is important to elucidate whether or not cancer survivors find it helpful.

Methods

Study Design and Patient Population

Patients were recruited from the Mayo Clinic Breast Disease Registry (MCBDR), an ongoing prospective cohort study that enrolls patients attending an outpatient breast clinic within one year of breast cancer diagnosis at a quaternary academic center since 2003 and follows them longitudinally. After informed consent was obtained for collection and review of tumor tissue, blood samples, medical records, and questionnaires, they were asked to complete annual mailed in surveys regarding breast cancer-related symptoms and treatments, including complementary and alternative treatments. For the current sub study, a yoga-focused survey was sent to all MCBDR participants who indicated that they currently or previous participated in yoga. A reminder letter with included survey was sent to non-respondents six weeks after initial survey.

Data Collection

Participants were asked to fill out a 20-item survey related to their experience with yoga post-cancer diagnosis. The survey data was collected between July-August 2019. The contents of that correspondence included a cover letter explaining the study as well as a survey assessing their yoga experience (Appendix A). Patients were asked about symptom severity before and after their experience with yoga, the type and number of treatments, any potential adverse effects of treatment, whether insurance helped to cover yoga, and the out-of-pocket cost for yoga (per session and total). Demographic data and details regarding type of breast cancer and treatment were extracted from Breast Registry survey on file.

Study data were managed using RedCap (Research Electronic Data Capture): a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.[8]

Materials

The yoga-focused survey instrument was developed jointly by the MCBDR team aiming to assess yoga practice. It was fielded in English only, and is found in Appendix A. Quantitative questions assessed joint pain, muscle pain, breast or chest wall pain, fatigue, anxiety, headache, decreased quality of life, hot flashes, nausea/vomiting, depression, difficulty sleeping, lymphedema, and numbness and peripheral neuropathy.

Participants were asked to grade the severity of their symptoms on a numerical scale before and after participating in yoga. The response options ranged from no symptoms (0) to severe symptoms (5). A 6-point Likert scale has been demonstrated to have higher trend of discrimination and reliability than 5-point Likert's scales.[9] A 6-point scale has been used in other standardized symptom severity surveys including pain and fatigue.[10,11] Additional questions addressed the further details about the patient's yoga practices, potential adverse effects of treatment, and financial considerations. This research survey was approved as an addition to the "Biospecimen Resource for Breast Disease Study" by the Mayo Clinic Institutional Review Board.

Data Analysis

Patient characteristics as frequencies with percentages, mean values and standard deviations (SD) and or range are presented when appropriate. Wilcoxon Signed Rank Test was performed to assess the overall perceived benefit of yoga. Chi-squared tests were used to compare independent samples. Bonferroni correction was used to adjust for multiple comparisons, resulting in a p-value threshold of 0.004 for statistical significance (i.e., 0.05/12). Participants that did not provide both pre- and post-severity scores were excluded (N = 135). All analyses where performed in JMP® 14.01 (SAS institute, Cary, NC).

Results

Participant Demographics and Clinical Features

Of the 3,379 MCBDR participants who completed a breast registry follow-up survey including the screening question about use of yoga ever, 1,049 reported that they had previously tried yoga or were currently participating in yoga at the time of that survey and represent the main analytic sample. A yoga-focused survey was mailed out

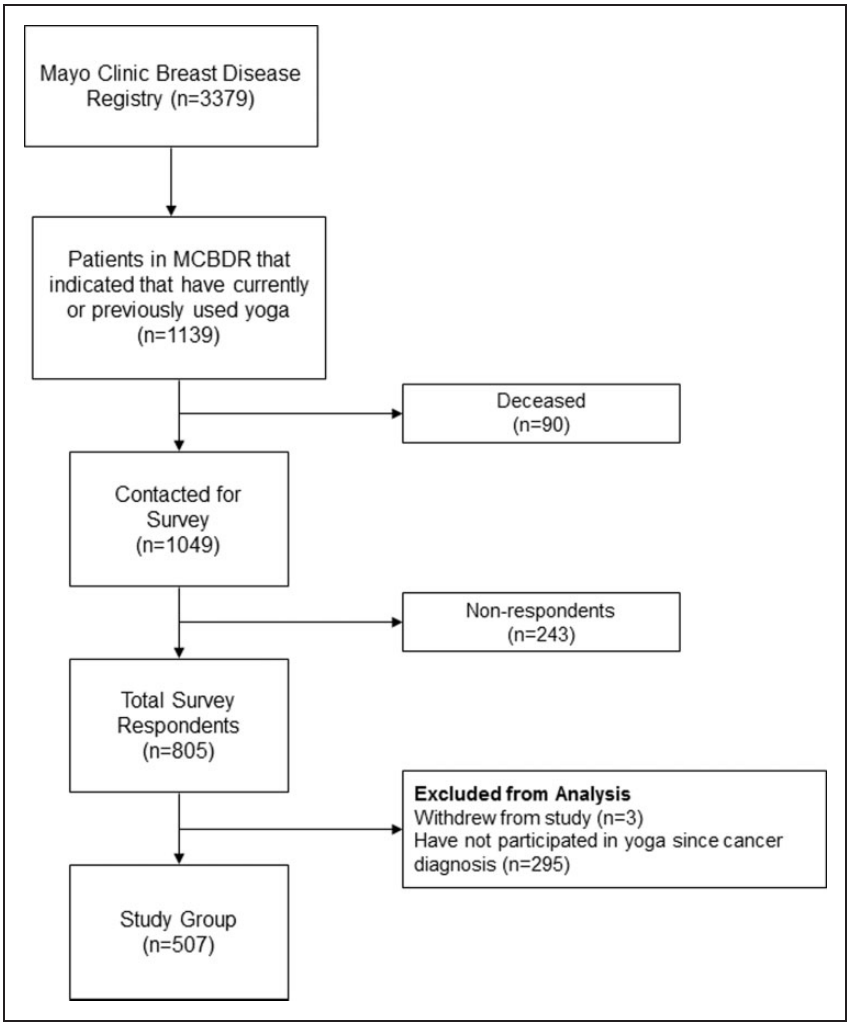

Figure 1. CONSORT Diagram.

to these 1,049 patients; 805 (76.7%) returned the survey. Among these, three withdrew from the Registry during the study period, and 295 reported having only participated in yoga prior to breast cancer diagnosis, leaving 507 for our analysis (Figure 1). The majority of respondents were Caucasian (94.8%). Other characteristics of the respondents and non-respondents are summarized in Table 1.

Table 1. Patient Characteristics.

Demographic	Respondents Included in Analyses (Users of Yoga After Cancer Diagnosis) N = 507 n (%)	Respondents Not Eligible Due to No Yoga After Cancer Diagnosis N= 295 n (%)	Non-Respondents N = 244 n (%)
Age at cancer diagnosis			
<50	71 (14.0)	33 (11.2)	45 (18.4)
50–59	152 (30.0)	65 (22.0)	67 (27.5)
60–69	167 (32.9)	97 (32.9)	80 (32.8)
≥70	117 (23.0)	100 (33.9)	52 (21.3)
Partner status, n (%)			
Married	409 (80.7)	222 (75.3)	184 (75.4)
Single	29 (5.7)	22 (7.5)	17 (7.0)
Divorced	50 (9.9)	27 (9.2)	29 (11.9)
Life partnership	2 (0.4)	0 (0.0)	0 (0)
Widowed	16 (3.2)	24 (8.1)	13 (5.3)
Prefer not to disclose	1 (0.2)	0 (0.0)	1 (0.4)
Race			
Caucasian	474 (93.5)	286 (96.9)	232 (95.0)
Black or African American	3 (0.6)	2 (0.7)	0 (0)
Asian	8 (1.6)	3 (1.0)	2 (0.8)
Other	9 (1.8)	1 (0.3)	4 (1.6)
Unknown/prefer not to disclose	13 (2.6)	3 (1.0)	7 (2.8)
Religion			
Christian	367 (72.4)	238 (80.7)	188 (77.0)
Hindu	1 (0.2)	0 (0.0)	1 (0.4)
Buddhist	2 (0.4)	0 (0.0)	0 (0)
Jewish	4 (0.8)	2 (0.7)	2 (0.8)
No religious affiliation	61 (12.0)	32 (10.8)	26 (10.7)
Unknown/prefer not to disclose	72 (14.2)	23	27 (11.1)
Smoking status at cancer diagnosis (%)			
Current smoker	13 (2.6)	3 (1.0)	9 (3.7)
Non-smoker	405 (79.9)	213 (72.2)	189 (77.5)
Prior smoker	56 (11.0)	51 (17.3)	22 (9.0)
Unknown	33 (6.5)	28 (9.5)	24 (9.8)
Cancer stage			
0	26 (5.1)	34 (11.5)	20 (8.2)
I	190 (37.5)	117 (39.7)	101 (41.4)
II	163 (32.1)	68 (23.1)	68 (27.9)
III	31 (6.1)	17 (5.8)	15 (6.1)
IV	1 (0.2)	5 (1.7)	2 (0.8)
Unknown	96 (18.9)	54 (18.3)	38 (15.5)
Time since diagnosis			
<3 years	30 (5.9)	13 (4.4)	4 (1.6)
3 to <6 years	152 (30.0)	122 (41.4)	93 (38.1)
6 to <9 years	96 (18.9)	48 (16.3)	46 (18.9)
9 to <12 years	103 (20.3)	43 (14.6)	42 (17.2)
>12 years	126 (24.8)	69 (23.4)	59 (24.2)
Cancer treatments received			
Surgery	348 (68.6)	128 (43.4)	168 (68.9)
Endocrine/hormonal therapy	241 (47.5)	130 (44.1)	114 (46.7)
Chemotherapy	195 (38.4)	80 (27.1)	98 (40.2)
Radiation	232 (45.8)	125 (42.4)	100 (41.0)

Of the 507 patients included in analyses, the mean age was 60.9 years (SD:10.45, range: 31 – 90). Based on self-reported data, 34/507 (6.7%) were diagnosed at Stage 0, 193 (38.1%) were diagnosed at Stage I, 143 (28.2%) at Stage II, 40 (7.8%) at Stage III, and 3 (0.6%) at Stage IV (Table 1). Staging data were not available for 94 of the patients included in our analysis.

Utilization of Yoga in Breast Cancer Survivors

Patients reported a variety of reasons for the use of yoga after their breast cancer diagnosis. A majority of patients (90.6%) used yoga to increase overall wellness/relaxation or to improve flexibility and balance. One hundred thirty-six (26.8%) indicated that they had used yoga to try to manage breast cancer-related symptoms. Table 2 illustrates the numbers of patients who used yoga for a variety of specific symptoms and how often they used it. The total number of yoga sessions that patients attended ranged from more than 100 (in 38.7%) to 51–100 (in 17.2%), 11–50 (in 31.2%) and <10 (in 10.8%). Only 9.3% of patients were referred to yoga by a medical professional.

Table 2. Yoga Use After Cancer Diagnosis (N = 507).

	N (%)
Learned of Yoga from	
Friend or relative	268 (51.9)
Medical professional	47 (9.3)
Internet	18 (3.6)
Other	172 (33.9)
Unknown	46 (9.1)
Frequency	
<1× per month	142 (28.0)
1–3× per month	157 (31.0)
1–3× per week	164 (32.4)
More than 3× per week	34 (6.7)
Unknown	10 (2.0)
Total number of yoga sessions attended	
<10	54 (10.8)
11–50	158 (31.2)
51–100	87 (17.2)
>100	196 (38.7)
Breast Cancer related symptoms prompting yoga	136 (26.8)
Joint pain	4
Muscle pain	7
Breast/chest pain	30
Fatigue	5
Anxiety	10
Back pain	3
Stiffness	7
Lymphedema	13
Neuropathy	4
Reduce scar tissue	8
Not reported	45
Side effects of yoga	58 (11.4)
Joint pain	29
Muscle/tendon pain	13
Breast/chest pain	5
Other	4
Not reported	8

In the 482 patients who responded to the question regarding medical insurance, only 5.2% reported that their insurance had covered their yoga practice. In the 254 patients who reported cost, the average total cost of yoga per person for the duration of their yoga therapy was $863.27.

Perceived Effects of Yoga on Breast Cancer-Related Symptoms

The vast majority of respondents (89.4%) reported some symptomatic benefit from yoga. Specifically, 75 (18.9%) reported almost complete or complete resolution of symptoms, 171 (43.1%) reported moderate improvement, and 109 (27.5%) reported a little bit of improvement; only 42 (10.6%) reported no benefit. Figure 2 outlines reported changes in symptoms that participants perceived to be related to yoga. There was a patient-perceived improvement in joint pain, muscle pain, breast or chest wall pain, fatigue, anxiety, headache, quality of life, hot flashes, nausea/vomiting, depression, difficulty sleeping, lymphedema, and peripheral neuropathy from pre-yoga severity scores ($p < 0.004$).

Of the 372 patients who completed the pre-yoga and post-yoga symptom matrix, an improvement of two points (on a 6-point scale) was seen in more than 15% of patients for the following symptoms: muscle pain, breast or chest pain, fatigue, anxiety, hot flashes, and sleep (Table 3). Of note, 11.4% of patients reported issues or negative side effects from participation in yoga, most commonly joint pain and muscle/tendon pain (Table 2).

We conducted a subgroup analysis to compare individuals who participated in yoga prior to diagnosis to those who first began yoga during or after diagnosis. There was no statistically significant difference in the proportion reporting any symptomatic benefit from yoga between the two groups (91.7% vs 88.0%, respectively, with $p = 0.26$).

Discussion

Symptom burden in breast cancer survivors can affect quality of life for many years into survivorship. Roughly one-third of survivors report a similar symptom severity to patients undergoing active cancer treatment.[12] While there is interest in harnessing alternative modalities to manage cancer-related symptoms and improve quality of life, evidence for use of yoga for symptom management related to cancer is limited. The data that are available typically focus

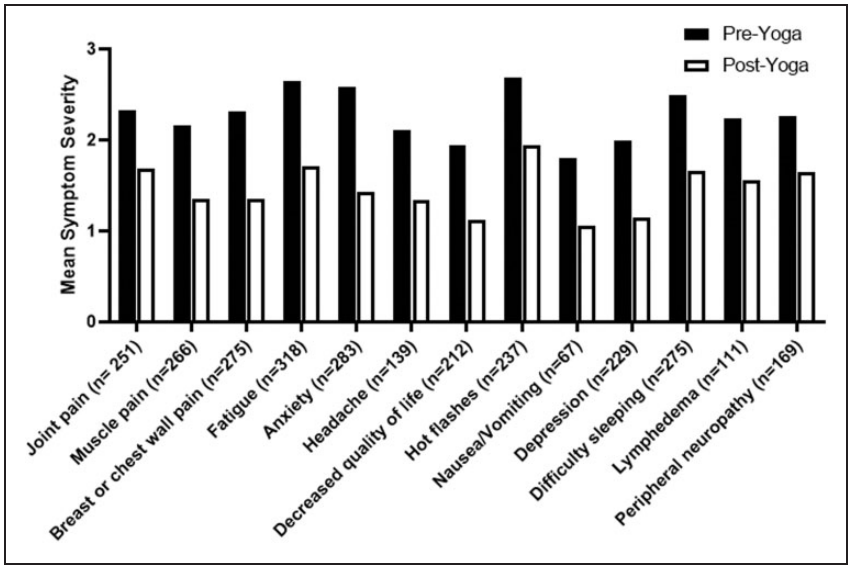

Figure 2. Severity Scores in Patients with Breast Cancer Before and After the participation in Yoga in Patients Reported Symptoms. Lower scores correlate with lower severity of symptoms.

Table 3. Proportion of Women Reporting Greater Than Two-Point Improvement in Symptom (N = 372).*

Symptom	N (%)
Joint pain	42 (11.3%)
Muscle pain	57 (15.3%)
Breast or chest wall pain	72 (19.4%)
Fatigue	85 (22.8%)
Anxiety	96 (25.8%)
Headache	24 (6.5%)
Decreased quality of life	37 (9.9%)
Hot flashes	56 (15.1%)
Nausea/Vomiting	10 (2.7%)
Depression	40 (10.8%)
Difficulty sleeping	60 (16.1%)
Lymphedema	28 (7.5%)
Peripheral Neuropathy	31 (8.3%)

*Only assessable in the 372 eligible respondents who completed both pre and post symptom severity questions.

on psychological symptoms such as emotional well-being and mood, rather than physical symptoms like pain. Yoga is a prevalent practice in breast cancer patients, with roughly one-third of the patients in the Mayo Clinic Breast Disease registry having indicated that they have tried yoga. It is important to characterize the patient perception of the impact of this practice on specific cancer-related symptoms, including physical symptoms such as breast/chest wall pain, nausea/vomiting, and headaches.

Our study demonstrates that there are patient-perceived benefits of yoga as an alternative and adjunct modality in combating cancer-related symptoms. While these preliminary findings need further prospective validation, they are important to consider when clinicians are discussing low-risk modalities to help patients with symptoms. Several systematic reviews have advocated for the use of yoga therapy for improving long-term quality of life and reducing fatigue, depression, and anxiety.[13–15] Although most prior randomized control trials evaluating the effects of yoga have focused on mental health benefits, the current work illustrates that substantial numbers of participants also perceive improvement in physical symptoms.

The present study is limited by its retrospective design, lack of diversity in patient population, and potential for response bias; patients who experienced benefit may be more likely to respond to a survey on this topic. Additionally, with retrospective studies, the temporal relationship between intervention and outcome is difficult to assess, and there is a potential for recall bias. However, the response rate of >75% and the similar characteristics of respondents and non-respondents support the validity of these data and suggest that there may be a perceived improvement in physical health benefits as well as mental health benefits. In this study, over 90% of patients reported some degree of symptomatic improvement.

In conclusion, yoga should be considered as an adjunct tool for symptom management during and after breast cancer therapy. Further prospective studies investigating the efficacy of yoga on both mental and physical symptoms and comparing yoga with other exercise and mind-body programs are warranted.

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Author Contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Shruti Patel, Jacqueline Zayas, and Jose Medina Inojosa. The first draft of the manuscript was written by Shruti Patel and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Consent

Informed consent was obtained from all individual participants included in the study.

Data Availability

The datasets generated during and/or analyzed during the current study are not publicly available due to patient confidentiality issues but are available from the corresponding author on reasonable request.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Dr. Fergus Couch is on Ambry Genetics and Qiagen's Speakers' Bureau, consults for AstraZeneca, receives travel grants from GRAIL and Qiagen, and receives research funding from GRAIL. Dr. Charles Loprinzi consults for PledPharmaCompany, Metys Pharmaceuticals, Asahi Kasei, Disarm Therapeutics, OnQuality Pharmaceuticals, NKMax, and Mitsubishi Tanabe Pharma, has intellectual property with Janssen, and receives research funding from Bristol-Myers Squibb.

Ethics Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Institutional Review Board at Mayo Clinic.

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Supplemental Material

Supplemental material for this article is available online.

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