

Research

A Feasibility Study of Restorative Yoga Versus Vigorous Yoga Intervention for Sedentary Breast and Ovarian Cancer Survivors

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Abstract

Yoga has been shown to improve cancer survivors' quality of life, yet regular yoga practice is a challenge for those who are sedentary. We conducted a pilot randomized controlled study to assess feasibility and adherence of two types of yoga intervention among sedentary cancer survivors. Sedentary breast and ovarian cancer survivors were randomized to practice either restorative yoga (minimal physical exertion, Group R) or vigorous yoga (considerable physical exertion, Group V) in three 60-minute supervised sessions a week for 12 weeks, followed by 12 weeks of home practice. Accrual, adherence, and attendance rates were assessed. Of the 226 eligible patients, 175 (77%) declined to participate in the study, citing time commitment and travel as the most common barriers. Forty-two subjects consented to participate in the study. Of the 35 participants who began the intervention (20 in Group R and 15 in Group V), adherence rate (percentage remaining in the study at week 12) was 100% and 87%, respectively. Rate of adequate attendance (more than 66% of the scheduled supervised sessions) was 85% and 73%, respectively. Rate of completion of the home practice period was 85% and 77%, respectively. In this study, sedentary cancer survivors were able to adhere to a long-term, regular yoga regimen. The rate of adequate attendance was higher for restorative yoga. Future studies for sedentary patients should focus on reducing time commitment and travel requirements to improve recruitment, and on using restorative yoga as a more feasible intervention for this population. *Lapen, Benusis, Pearson, et al. Int J Yoga Therapy 2018(28). doi: 10.17761/2018-00039.*

Keywords: cancer survivors, Restorative Yoga, feasibility, sedentary

Introduction

Yoga is a multifarious mind-body practice that combines physical movements through a series of poses with breath control and meditation. It improves strength, flexibility, and balance while promoting relaxation, mental clarity, and peace of mind. Several studies have shown that yoga effectively improves quality of life among cancer patients and survivors.¹⁻⁴ Additionally, a recent meta-analysis of 23 randomized controlled trials that examined the effects of yoga on breast cancer survivors found that yoga improves sleep quality and reduces fatigue, depression, and anxiety.⁵ However, none of these studies focused on sedentary survivors.⁶

Despite the benefits, getting sedentary individuals to do regular yoga practice has been challenging. Cancer survivors are on average less active and more sedentary than their peers who have not had cancer.^{7,8} This trend is of particular concern because sedentary behavior or prolonged sitting has recently been identified as an additional risk factor for cancer progression and disease mortality, distinct from lack of physical activity.⁹⁻¹¹ Perceived barriers to physical activity in cancer survivors include fatigue, pain, and anxiety, and lack of time, self-discipline, and interest following pernicious cancer treatment.^{12,13}

We are interested in determining whether sedentary cancer survivors can participate in and adhere to a regular yoga practice regimen. We conducted this randomized controlled pilot study to answer the following questions: Are sedentary cancer survivors open to a yoga intervention? Can they adhere to the yoga practice? And will they continue to practice yoga on their own once taught how to properly do so? Additionally, we compared adherence and attendance rates for two different types of yoga intervention (restorative

and vigorous) to explore differences in how the interventions were received and whether physical exertion encourages or discourages full participation in the yoga programs. To our knowledge, this is the first study that has compared the feasibility of two different types of yoga intervention for sedentary cancer survivors.

Methods

This was a two-arm randomized controlled pilot study to evaluate two types of yoga intervention (vigorous and restorative) for sedentary cancer survivors, conducted at an urban comprehensive cancer center.

Study Population

Eligible subjects were sedentary women (age > 18 years) with a history of stage 0–III breast cancer or stage I–III ovarian cancer, who had completed all antitumor therapies, with the exception of hormonal therapy, at least 60 days prior to enrollment. Eligible subjects had an ECOG Performance Status of 0 or 1 within 90 days of enrollment. Being sedentary was defined as having engaged in less than 90 minutes/week of moderate-intensity physical activity (not exhausting, light perspiration; e.g., fast walking, tennis, easy bicycling, easy swimming, popular or folk dancing) during the preceding 2 months, and less than 30 minutes per month of any high-intensity physical activity (heart beats rapidly, sweating; e.g., running, aerobics classes, cross-country skiing, vigorous swimming, vigorous bicycling) in the preceding 2 months.¹⁴ Exclusion criteria included evidence of active malignant disease, breast implants (which limit the performance of many yoga poses), significant cardiopulmonary disease, severe arthritis, or any medical conditions that would make yoga practice unsafe. Patients who regularly used beta-blockers or calcium channel blockers, which may blunt heart rate response to exertion, or those unlikely to be compliant (usually because of social factors that prevent patients from attending classes or doing home practice) were also excluded.

Potential study candidates were contacted by letters introducing the study, referred to the study by their clinicians, or self-referred after learning about the study from websites or flyers. Once in contact, patient eligibility was further assessed. Informed consent and medical clearance by one of the physician investigators were obtained for patients who were eligible and willing to participate in the study.

Randomization was conducted by the Clinical Research Database (CRDB) at Memorial Sloan Kettering Cancer Center (MSKCC) in randomly permuted blocks. Assignment concealment was achieved by the CRDB computer system. Randomization was stratified by history of breast or ovarian cancer.

Intervention

Study participants were randomized to one of two 12-week yoga programs: restorative or vigorous. Both yoga programs were vinyasa-based and used transitions that were coordinated with inhales and exhales. The restorative program consisted of stable, restful poses performed at a slow pace. The vigorous program consisted of difficult poses that required additional coordination and effort, done at a pace quick enough to keep the subjects' heart rates (HR) at 60%–70% of their maximum (HRmax), considered moderate-intensity exercise. The participants' age-predicted HRmax was calculated using the Haskell and Fox formula ($HR_{max} = 220 - \text{age}$).¹⁵ Subjects in the vigorous group wore HR monitors (Polar H7 made by Polar Electro, Inc.). The monitors were paired to an iPad via Bluetooth, and up to 10 patients' HRs could be monitored in real time on the screen using the Polar app. During supervised practice sessions, changes in tempo and number of repetitions of the yoga movements were made to keep the study participants' HRs within this range.

Both interventions involved (1) an initial intake session in which subjects were assessed for previous yoga experience, ability to perform the poses, and any safety concerns that had not surfaced during the screening stage; (2) a 12-week practice period in which subjects attended 60-minute sessions, three times a week under the instruction of a yoga instructor; and (3) a 12-week home practice period in which subjects were instructed to practice at home what they had learned in the supervised sessions three times a week, each time for 60 minutes. A minute-by-minute outline of a typical restorative and vigorous supervised yoga class is detailed in Table 1. The supervised sessions took place at MSKCC's Bendheim Integrative Medicine Center or the Integrative Medicine space at the Evelyn H. Lauder Breast and Imaging Center.

Outcome Measures

The primary objective of this pilot study was to determine the feasibility of yoga practice for previously sedentary breast and ovarian cancer survivors. The numbers of study participants at each step from recruitment to completion of the study were recorded. For feasibility outcome, subjects were considered to have adequate attendance if they attended no less than 66.7% of the supervised yoga sessions. A yoga regimen was deemed feasible if at least 75% of the participants in the group had adequate attendance. This was defined a priori.

Results

Between January 2014 and February 2017, a total of 518 patients were assessed for eligibility; of these, 226 were

Table 1. Breakdown of 60-Minute Yoga Sessions

	Restorative Yoga (Group R)	Vigorous Yoga (60%–70% HRmax) (Group V)
5 minutes	Supported fish pose	Supine warmup
5 minutes	Supported side-resting postures	Quadruped warmup
5 minutes	Seated upright postures	Sun salutations
5 minutes		
5 minutes	Quadruped postures	Breathing exercise
5 minutes		Standing poses
5 minutes	Prone postures	
5 minutes		
5 minutes	Child's pose	
5 minutes	Supine postures	Inversions
5 minutes		Stretch/cool down
5 minutes	Relaxation	Centering/closing

found to be eligible. Reasons for ineligibility are outlined in Table 2. Of the 226 eligible subjects we identified, 175 (77.4%) declined to participate, 9 (4.0%) were lost to follow-up, and 42 (18.6%) consented to participate. Reasons for nonparticipation (Table 3) included time commitment, travel required, change in sedentary status, recent injury, and lack of interest in yoga.

Following consent and randomization, an initial intake session was done. Of the 42 subjects who consented to participate in the study, 21 were assigned to the restorative yoga group (Group R) and 21 were assigned to the vigorous yoga group (Group V). The initial intake sessions, which were done before the first supervised yoga class, were specific to the intervention groups. One subject in Group R was excluded during the intake session because it was discovered that she was no longer sedentary as defined by the study protocol. Six subjects were lost from Group V: Two participants were excluded due to scheduling issues, two due to unrelated cardiac incidents that were identified after registration (one patient had history of atrial fibrillation; another had an abnormal stress test), one due to an easily elevated HR, and another due to high blood pressure that required calcium channel blockers to control. Participants

Table 2. Study Recruitment: Reasons for Ineligibility

Assessed for eligibility	518 (100%)
Eligible	226 (43.6%)
Ineligible	292 (56.4%)
Not sedentary	94 (32.3%)
Interfering medical condition	74 (25.3%)
Interfering medication	36 (12.3%)
No history of stage I–III breast or ovarian cancer	22 (7.5%)
Breast implants	10 (3.4%)
Evidence of active disease	5 (1.7%)
Receiving treatment	4 (1.4%)
Other	47 (16.1%)

Table 3. Study Recruitment: Reasons for Declining to Participate

Eligible participants	226 (100%)
Consented to participate	42 (18.6%)
Declined to participate	175 (77.4%)
Unable to make time commitment	70 (40.0%)
Unable to travel	44 (25.1%)
Not specified	25 (14.3%)
Unable to contact	21 (12.0%)
No longer sedentary	11 (6.3%)
Recent injury	2 (1.1%)
Not interested in yoga	2 (1.1%)
Other (lost to follow-up)	9 (4.0%)

Table 4. Characteristics of Subjects Who Received Intervention

	Group R (n = 20; 57%)	Group V (n = 15; 43%)
Age, years	55 (53, 60)	58 (54, 62)
Race		
White	16 (80.0%)	13 (86.7%)
Black	2 (10.0%)	0 (0.0%)
Asian	1 (5.0%)	1 (6.7%)
Hispanic	1 (5.0%)	0 (0.0%)
Unknown	0 (0.0%)	1 (6.7%)
Cancer type		
Breast cancer	18 (90.0%)	13 (86.7%)
Ovarian cancer	2 (10.0%)	2 (13.3%)

from both groups who were no longer in the study were excluded from our feasibility assessment, thus leaving 20 patients in the restorative yoga arm and 15 in the vigorous yoga arm.

A total of 35 participants began treatment after randomization and the initial intake session, 20 in Group R and 15 in Group V. The median age in Group R was 55 and 58 in Group V. Most participants were Caucasian with a history of breast cancer (Table 4).

Intervention Adherence and Attendance

Adherence rate was defined as the proportion of participants in each group who did not leave the study during the 12-week supervised class period. Twenty (100%) participants in Group R and 13 (87%) participants in Group V attended classes for the entire 12-week intervention period. Two participants in Group V withdrew from the study during this time due to exacerbation of joint pain, leaving 13 to continue on to the home practice phase. Both withdrawn participants reported having prior musculoskeletal injuries that were aggravated by the vigorous yoga practice.

Of the 36 individual supervised yoga sessions that took place over the course of 12 weeks, the average attendance rate was 80% for Group R and 74% for Group V. Participants were considered to have adequate attendance if they attended at least two-thirds (66.7%) of the supervised yoga classes. By this definition, 17 (85%) participants in Group R and 11 (73%) participants in Group V had ade-

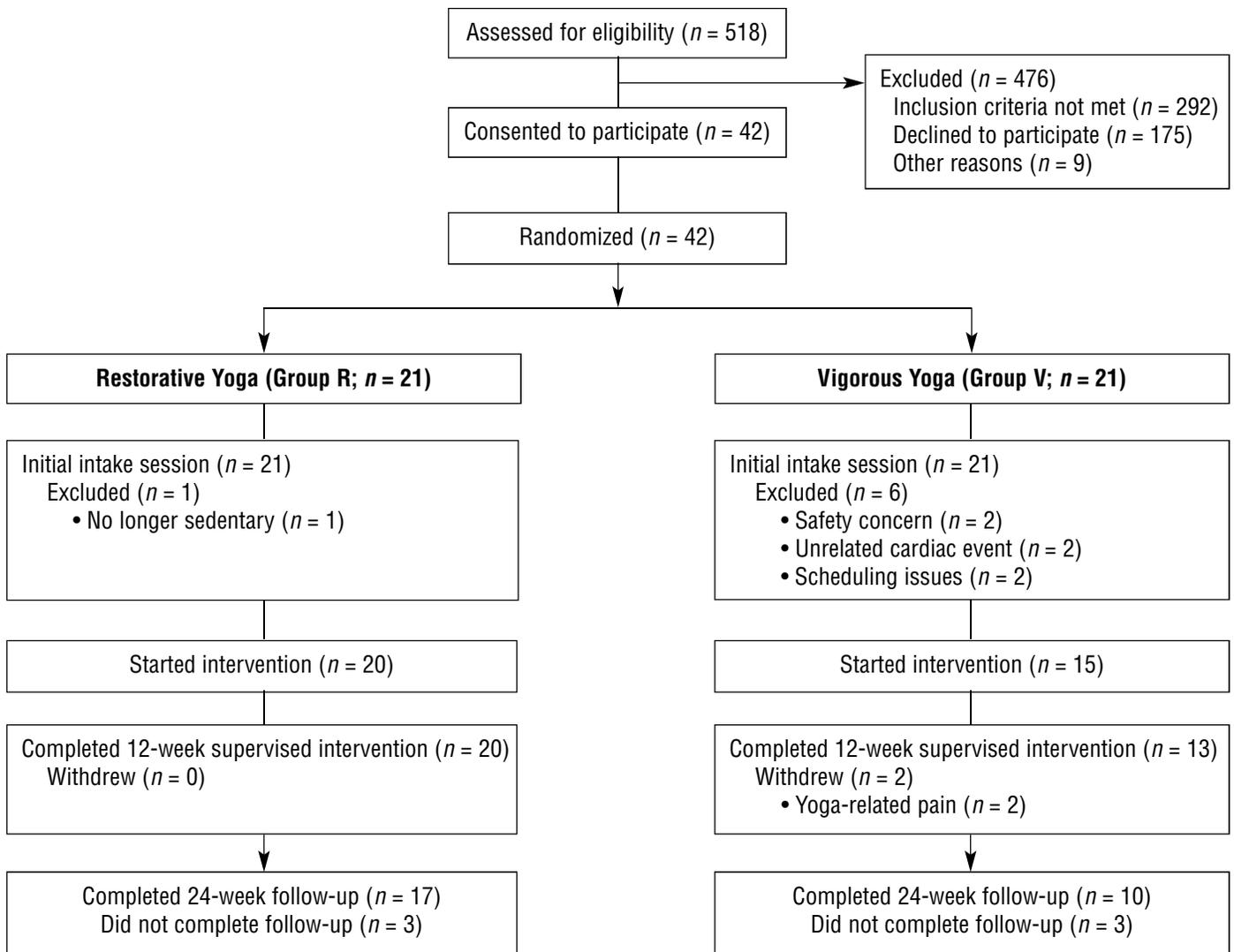
quate attendance and were considered to have completed the intervention, the latter not reaching our 75% a priori threshold for feasibility.

Following the supervised sessions, participants were instructed to continue practicing their respective yoga type at home. During this follow-up period, 3 participants from each intervention group were lost to follow-up. Thus, 17 (85%) of the 20 participants in Group R and 10 (77%) of the remaining 13 participants in Group V continued practicing yoga at home for an additional 12 weeks on their own. The CONSORT diagram is shown in Figure 1.

Discussion

Yoga has been shown to benefit cancer patients and cancer survivors, yet we do not know whether sedentary cancer survivors will practice yoga regularly, nor the barriers to regular practice. We conducted a two-arm randomized controlled trial to assess the feasibility of two types of yoga intervention for sedentary breast and ovarian cancer survivors. The two distinct yoga interventions, restorative and vigorous yoga, involved different degrees of physical exertion. We found that few patients (1%) were not interested in yoga, yet 77% could not participate in the study, mainly due to difficulties with time and travel. Most of those who participated did stay for the entire 12-week program, and most of those who finished the supervised sessions continued with home practice. The required physical exertion appears to be a barrier to attendance, as those in Group V attended fewer supervised practice sessions than desired.

A large percentage (77%) of eligible subjects declined to participate in the study. The two most commonly cited reasons for declining to participate were time commitment and travel distance to the instructor-led yoga class locations. On the other hand, only 1% of the cancer survivors contacted said they were not interested in yoga. The yoga classes in the present study were held at a large comprehensive cancer center in New York City that attracts patients from a wide array of geographical locations; this potentially explains why time and travel limited our ability to recruit participants from the patient population. Past studies have faced similar recruitment barriers.^{16,17} Additionally, a qualitative study that evaluated yoga for cancer survivors found that transportation, time, and scheduling were prominent barriers to yoga practice.¹⁸ Our findings, in conjunction with the findings from those studies, demonstrate the need to develop ways for cancer survivors to practice yoga remotely. Offering classes in regional locations closer to patients or providing online video instruction could decrease or eliminate the time needed to travel to class and allow cancer survivors to practice yoga more easily.

Figure 1. CONSORT Diagram of Study Enrollment and Participant Adherence

During the course of the 12-week supervised yoga practice, 100% of the participants in Group R and 87% of the participants in Group V were retained. The dropout rate for the vigorous yoga practice was 13% (2 of the 15 participants). One patient withdrew due to back pain, whereas the other withdrew due to a shoulder injury; both problems were aggravated by the vigorous yoga practice.

In a systematic review that evaluated 16 yoga trials, the dropout rate was 0%–38%.¹ Of the 16 studies included in the review, 2 trials evaluated yoga programs that lasted 12 weeks or longer, and none of them required participants to attend class three times a week like our study. A recent 6-month yoga trial that asked participants to practice for 3 hours a week had a fairly high dropout rate: 11 of the 31 (35%) participants in the yoga arm withdrew from the study.¹⁹ Considering the length and class frequency of our program, the fact that 100% and 87% of participants were able to adhere to the restorative and vigorous yoga programs, respectively, and stayed for 12 weeks is encouraging

and promising. The results indicate that motivated patients are willing to continue taking part in a long regular yoga program even when they may not be able to attend every session.

Attendance rates were high for both groups. On average, participants in Group R attended a larger proportion of the supervised yoga sessions (80%) than participants in Group V (74%). Both of these attendance rates are comparable to those observed in similar yoga trials.^{17,20–22} However, the attendance rate in Group V did not meet our a priori criterion for feasibility, which we defined as 75% of participants in each group attending no less than two-thirds of the supervised class sessions. Based on this definition, the restorative yoga intervention was found to be feasible (85%), whereas the vigorous yoga intervention missed the mark by 2% (73%). Four participants in the vigorous yoga group were unable to attend at least two-thirds of the supervised sessions: Two dropped out of the study due to pain, one missed several classes due to knee pain, and another

missed several classes due to family circumstances. The fact that three patients dropped out or missed class due to pain is worrisome and likely indicates that a vigorous yoga intervention may be too taxing for previously sedentary cancer survivors.

To our knowledge, this is the first study that has sought to determine whether sedentary cancer survivors can do a vigorous, vinyasa-based yoga practice. Prior studies have mainly used Iyengar, Restorative, or Hatha Yoga, all of which are much gentler.^{1,3} There have been other studies in which cancer survivors have successfully engaged in moderate-intensity physical activity, but they used 15- to 40-minute biking or walking routines to increase the participants' HRs above 60% of their maximum.^{23,24} The vigorous yoga practice in this study was demanding and more dynamic than these interventions, as it required participants to perform a wide array of movements using several different muscle groups to change from one yoga pose to another in 60-minute sessions. In contrast, biking or walking routines involve mostly repetitive lower-body movements in the same stance for 15 to 40 minutes.

Limitations

Our study has some limitations that need to be acknowledged. First, this was a pilot study with a small sample size: 42 participants consented, and 35 began the intervention. Second, seven participants were excluded from the study during the initial intake session, before they had started the intervention but after they had been randomized. As a result, Group R started with 20 participants, whereas Group V started with 15. Although five of the participants excluded would have been dismissed regardless of intervention group, two participants excluded from Group V were removed from the study due to concerns picked up by the HR monitors (quickly exceeding 60% HRmax with minimal exertion from only a few yoga moves). Group R participants did not wear HR monitors at any point during the study, as the physical movements were too gentle to significantly increase HR. Third, people who chose to participate in the study were likely to be familiar with and accepting of yoga, resulting in self-selection bias. Fourth, the study only included women with a history of breast or ovarian cancer, limiting generalizability to other cancers.

Despite these limitations, to our knowledge this is the first trial that assessed the feasibility of a vigorous yoga intervention for any type of cancer survivor. It is also the first study to examine differences in adherence and attendance rates for two different types of yoga practice: restorative and vigorous. Findings from our study shed light on how to improve recruitment, adherence, and attendance in future yoga studies for sedentary cancer survivors.

Conclusions

We found that sedentary breast and ovarian cancer survivors are able to adhere to a long-term, regular yoga practice. Time commitment and travel were major barriers to recruitment for this yoga study. Restorative yoga had a higher rate of adequate attendance within this study, and thus appears to be more feasible for future study in this particular population. Physical exertion in the vigorous yoga intervention appeared to have deterred the cancer survivors from attending the sessions frequently enough and caused higher dropout. However, attribution of adherence and feasibility for any vigorous yoga practice with sedentary cancer survivors is potentially influenced by the selection of postures, use of transitions that match participants' motor skills, ability of participants to respond to verbal cues within a group setting, and the instructor's ability to influence all of these factors. Most study participants were able to continue the yoga practice at home after completing the supervised period. Future studies should focus on reducing time commitments and travel requirements to improve recruitment, and on using restorative yoga as the more feasible intervention for sedentary cancer survivors.

Funding/Support

This study was supported in part by an Integrative Medicine and Translational Research Grant from Memorial Sloan Kettering Cancer Center, the Rockefeller Fund, and NIH/NCI Cancer Center Support Grant P30 CA008748. Research reported in this article was also supported by the National Cancer Institute of the National Institutes of Health under award R25CA020449. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Clinicaltrial.gov registration number NCT02305498.

Conflict-of-Interest Statement

The authors have no financial conflicts of interest to report.

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