The Effects of Yoga Intervention on Quality of Life for Breast Cancer Patients: A Critical Appraisal of the Topic

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The Effects of Yoga Intervention on Quality of Life for Breast Cancer Patients: A Critical Appraisal of the Topic

Disciplines
Occupational Therapy

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The Effects of Yoga Intervention on Quality of Life for Breast Cancer Patients: A Critical Appraisal of the Topic

Introduction

Women living with breast cancer are potentially susceptible to a diminished quality of life as a result of the complications associated with cancer and the secondary effects of treatment. This population often experiences and has to cope with such factors as physical discomfort, anxiety, pain, fatigue, and emotional distress throughout their daily lives. These barriers ultimately hinder their performance in several aspects of their daily occupations. For this reason, it is important for health care professionals to identify and incorporate various methods into treatment that help to relieve distress and discomfort for individuals in this population.

After exploring complementary treatment methods for women with breast cancer, yoga interventions were commonly identified in the literature as a positive adjuvant therapy for breast cancer treatment. Several studies have found that yoga interventions are beneficial in relieving cancer-related symptoms, as individuals who are limited by immobility, illness, or stress can benefit from the gentle physical activity and mind-body interaction imposed by yoga. As such, individuals with breast cancer can enhance the development of awareness of sensations and movements throughout their body, while focusing more specifically on techniques for addressing cancer concerns and treatment side effects. Furthermore, individuals can counteract both the psychological and physiological constraints of cancer, which subsequently leads to improvements in quality of life.

Upon deciding on the theme of yoga as an intervention method, the following PICO question was developed: What are the effects of yoga on perceived quality of life for women living with breast cancer? Addressing this PICO question, our search was refined in order to continue with the critical appraisal process.

Review Process

The following describes the process which was used to develop this critically appraised topic. It includes the strategies used in order to search and select articles to appraise in relation to our PICO question. Search strategies include inclusion and exclusion criteria that will be discussed in the following sections. Our PICO question has been refined and the drafts of our critically appraised papers have been revised by a doctoral professor from the School of Occupational Therapy at Pacific University.
Procedures for Selection and Appraisal of Articles

Inclusion criteria narrowed the research to sources that deal with breast cancer in women and yoga; yoga as complementary therapy; yoga and groups; social support with yoga; yoga and recovery from breast cancer; yoga and health outcomes from breast cancer; and yoga and quality of life for women living with breast cancer. Inclusion criteria included all types of studies.

Exclusion criteria bypassed sources that dealt with articles published before 1999, articles written in languages other than English, articles not available in full-text, and yoga interventions based solely on individual exercise programs.

Search Strategy
Refer to Table 1 for the search strategies used for the appraisal of the topic.

Table 1:

<table>
<thead>
<tr>
<th>Categories</th>
<th>Key Search Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient/Client population</td>
<td>breast cancer in women</td>
</tr>
<tr>
<td>Intervention</td>
<td>yoga, yoga groups, social support groups</td>
</tr>
<tr>
<td>Outcome</td>
<td>quality of life, health outcomes, recovery</td>
</tr>
</tbody>
</table>

Databases and Sites Searched

Our sources included CINAHL, MEDLINE, PubMed, Evidence-Based Medicine Reviews Multifile, PsycINFO, Europe PubMed Central, and the use of hand-searching where appropriate. A list of the study designs and the number of articles selected for appraisal for each level of evidence and methodology is found in Table 2. Additionally, Table 3 indicates the search strategies used to retrieve articles relevant to the research question. Levels of evidence used in this critically appraised topic are based on Tomlin’s (2011) research pyramid, focusing specifically on experimental research design.

Table 2:

<table>
<thead>
<tr>
<th>Level of evidence</th>
<th>Study design/Methodology of selected articles</th>
<th>Number of articles selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Meta-analysis of related experimental studies</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>Individual (blinded) randomized controlled</td>
<td>8</td>
</tr>
<tr>
<td>Source</td>
<td>Search terms and search strategies used</td>
<td>Limits Used</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>MEDLINE</td>
<td>First searched for <em>cancer</em>, then <em>yoga</em>, then <em>wound healing</em>, and then combined the key terms.</td>
<td>Limited to articles published between 2000 and 2012.</td>
</tr>
<tr>
<td>MEDLINE</td>
<td>First searched <em>complementary therapy</em>, then <em>breast cancer</em>, then <em>quality of life</em>, and then combined the key terms.</td>
<td>Limited to articles published between 2000 and 2012.</td>
</tr>
<tr>
<td>CINAHL</td>
<td>First searched for <em>social support</em>, then <em>breast cancer</em>, then <em>recovery</em>, and then combined the key terms. Full text requested through ILLiad.</td>
<td></td>
</tr>
<tr>
<td>MEDLINE</td>
<td>First searched for <em>yoga</em>, then <em>breast cancer</em>, then <em>qualitative</em>, and then combined the key terms.</td>
<td>Limited to qualitative research.</td>
</tr>
<tr>
<td>Evidence-Based Medicine Reviews Multifile</td>
<td>First searched for <em>yoga</em>, then <em>breast cancer</em>, then <em>quality of life</em>, and then combined the key terms.</td>
<td></td>
</tr>
<tr>
<td>Database</td>
<td>Search Terms</td>
<td>Citations Returned</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>CINAHL</td>
<td>First searched <em>breast cancer</em>, then <em>yoga</em>, and then <em>quality of life</em>, and then combined the key terms.</td>
<td>Returned 27 citations</td>
</tr>
<tr>
<td>NCBI</td>
<td>First searched for <em>breast cancer</em>, then <em>yoga</em>, then <em>complementary therapies</em>, then <em>quality of life</em>, then <em>meta analysis</em>, then <em>review</em>, and then combined the key terms.</td>
<td>Limited to systematic reviews.</td>
</tr>
<tr>
<td>PsycINFO</td>
<td>First searched for <em>breast cancer</em>, then <em>yoga group</em>, then <em>quality of life</em>, and then combined the key terms.</td>
<td>Returned 1 citation 1 citation was helpful:</td>
</tr>
<tr>
<td>CINAHL</td>
<td>First searched for <em>breast cancer</em>, then <em>yoga group</em>, then <em>quality of life</em>, and then combined the key terms.</td>
<td>Returned 9 citations 1 citation was helpful:</td>
</tr>
<tr>
<td>MEDLINE</td>
<td>First searched for <em>breast cancer</em>, then <em>yoga group</em>, then <em>quality of life</em>, and then combined the key terms.</td>
<td>Returned 39 citations 1 citation was helpful:</td>
</tr>
<tr>
<td>CINAHL</td>
<td>First searched for <em>breast cancer</em>, then <em>quality of life</em>, then <em>yoga</em>, and then combined the key terms. Full text requested through ILLiad.</td>
<td>Returned 28 citations 1 citation was helpful:</td>
</tr>
<tr>
<td>PubMed</td>
<td>First searched for <em>breast cancer</em>, then <em>yoga group</em>, and then combined the key terms.</td>
<td>Returned 13 citations 2 citations were helpful:</td>
</tr>
</tbody>
</table>
First searched for breast cancer, then yoga group, then quality of life, and then combined the key terms in Evidence-Based Medicine Reviews Multifile. Retrieved one citation (Yoga improves quality of life and benefit finding in women undergoing radiotherapy for breast cancer), but could not retrieve full text.

Hand searched related articles from reference list of article on additional cite.

Retrieved 112 citations from hand search
2 citations were helpful:


* Compliments of Isaac Gilman

Table 4 is a matrix that summarizes each of the articles appraised – addressing population and sample size, intervention and control groups, outcome measures, and results of each study. It is advised that the reader refers to the full-length articles for a more in-depth understanding of each study.

Summary of Key Findings

Summary of Levels: I

A variety of stressful components and mood disturbances have been identified in populations coping with such conditions as breast cancer, which ultimately contributes to decreased quality of life and longer recovery processes. Several studies have focused on the impact of non-pharmacologic therapies (i.e., yoga) to help relieve the psychological and physiological reactions associated with breast cancer both prior to surgery and postoperatively. Consequently, yoga has been one of the most commonly used approaches in improving symptoms of stress and anxiety that affect breast cancer patients’ quality of life. According to a systematic review conducted by Li and Goldsmith (2012), twenty-five of thirty-five trials reported a significant decrease in stress and/or anxiety symptoms when implementing yoga interventions. Fourteen of these thirty-five trials, however, provided inconsistent support for yoga despite noted biochemical and physiological indicators of mood disturbance (Li & Goldsmith, 2012).
In another systematic review by Cramer, Lange, Klose, Paul, and Dobos (2012), the authors found evidence that yoga provides short-term effects for improving psychological health in breast cancer patients, although these effects could not be clearly differentiated from potential bias. As yoga practice is a newer treatment option for breast cancer and has not been well supported by statistically appropriate study designs, according to Li and Goldsmith (2012), yoga is not intended to replace traditional medical practices and treatment for breast cancer before further investigation. Despite limited statistical evidence for the use of yoga in breast cancer treatment, yoga programs are cost-effective, do not cause drug interactions, and appear to be safe approaches to improving quality of life (Li & Goldsmith, 2012). Such evidence warrants recommendation for yoga in practice if used as an adjuvant treatment to pharmacologic therapy, in order to improve symptoms of stress and anxiety during active cancer treatment.

Summary of Levels: II, III

Yoga intervention can be incorporated into breast cancer treatment in various ways to provide psychotherapeutic benefits for patients undergoing surgery. Apart from reducing psychological distress, yoga has been shown to help in altering endocrine and immune functions, which lowers the risk of infections and therefore improves postoperative outcomes and recovery processes (Rao et al., 2008b). It also contributes to decreased fatigue and insomia (Bower, Garet, & Sternlieb, 2011; Vadiraja et al., 2009), a reduction in the length of hospital stays (Rao et al., 2008b), decreased diarrhea (Culos-Reed, Carlson, Daroux, & Hatley-Aldous, 2006), and reduced frequency and/or intensity of post-chemotherapy nausea and vomiting (Raghavendra et al., 2007; Vadiraja et al., 2009) among other factors. Improvements in emotional function (Culos-Reed, Carlson, Daroux, & Hatley-Aldous, 2006; Moadel et al., 2007) and wound healing (Rao et al., 2008b) have been linked to yoga interventions as well.

Group differences favoring the yoga group were indicated for improvement in quality of life, decrease in distress, and increased emotional well-being based on the results of three different studies by Culos-Reed, Carlson, Daroux, and Hatley-Aldous (2006), Moadel et al. (2007), and Raghavendra et al. (2007). Additionally, studies by Danhauer et al. (2009) and Moadel et al. (2007) found favorable outcomes for spiritual well-being in the yoga groups when compared to the control group. In a study by Banerjee et al. (2007), DNA damage as a result of radiotherapy was 14.5% lower for participants in the yoga group than in the control group despite significant DNA damage for both groups. This suggests that yoga therapy has both a psychological and physiological benefit for individuals with breast cancer.

Decreases in depression and anxiety were the most common themes found throughout most of the randomized control trial studies. Rao et al. (2008a) found reduced anxiety states and traits post-surgery for the yoga group, as well as a significant decrease in depression scores, symptom severity, and distress. Banerjee et al. (2007) reported significant decreases in anxiety
and depression levels for the yoga group, in addition to decreased stress scores post-radiotherapy. Raghavendra et al. (2007) also noted a decrease in the intensity of symptoms of anxiety and depression when engaging in yoga. As physical activity has shown to improve quality of life and mood disturbances, these studies further indicate the psychological importance of using gentler physical activities, such as yoga, to promote regular participation in exercise for individuals who may face barriers to engaging in active lifestyles.

Five less rigorous studies were analyzed and the authors identified similar factors and results favoring yoga intervention, although two of these studies incorporated qualitative components into their method. In a study by Hann, Baker, Denniston, and Entrekin (2005) analyzing multiple forms of complementary therapy (CT) beyond just yoga practice, the authors found no relationship between the use of CT and an increase in scores on a life satisfaction measure. The authors noted, however, several examples of individuals’ self-reported benefits in using CT. These results support the perceived benefits of using CT to cope with the stress and demands of breast cancer treatment, which ultimately improves quality of life.

Another study by Hockett (2005) found that participants in the yoga group had significant differences (i.e., higher levels) in the social functioning and vitality measures in comparison to the control at the end of the ten week program. They also had a decline in scores over time for cancer-related fatigue, which emphasizes the practicality of yoga in reducing distressed moods. Additionally, Ulger and Yagli (2010) found that the yoga group had significantly decreased scores in trait and state anxiety as compared to scores prior to yoga intervention, indicating the benefit of yoga for relaxation and psychological support during cancer treatment. Quality of life and participant satisfaction with the exercises were also significantly higher after the eight yoga sessions, such that the patients continued to practice yoga after the conclusion of the study. These results suggest that yoga can be used in practice to increase mind-body connection, prevent potential risks associated with cancer treatment, and positively facilitate the treatment process.

Results from these studies, however, are difficult to differentiate between the impact of yoga intervention and the social components associated with them, as most control groups incorporated some form of social support or counseling. Furthermore, the fact that six of the fifteen studies were conducted by at least some of the same authors warrants concern for potential biases in the study methods, procedures, and intervention process. Use of similar outcome measures for anxiety, depression, and cancer-related factors may also yield additional concerns in the validity of the studies’ results for application to practice. Regardless of the methodology used in these studies, yoga treatment has consistently shown to benefit individuals undergoing breast cancer treatment in several areas of functioning.
<table>
<thead>
<tr>
<th>Author, year</th>
<th>Study Objectives</th>
<th>Study design/Participants</th>
<th>Level of Evidence</th>
<th>Sample Size</th>
<th>Interventions and outcome measures</th>
<th>Summary of results (Conclusions and implications)</th>
<th>Study Limitations</th>
</tr>
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<tbody>
<tr>
<td>Cramer, Lange, Klose, Paul, &amp; Dobos, 2012.</td>
<td>Systematically assess and meta-analyze the current literary evidence for effects on health-related quality of life and psychological benefits in breast cancer patients and survivors.</td>
<td>Systematic review and meta-analysis of Randomized control trials (RCT) looking at breast cancer patients and survivors over the age of 18.</td>
<td>I</td>
<td>$n = 18 - 164$ women over 18 years old with a history of breast cancer.</td>
<td>I: Studies were included that compared yoga with no treatment or any active treatment. Studies were excluded if yoga was not the main intervention but rather a part of a multimodal intervention, such as mindfulness-based stress reduction. No restrictions were made regarding yoga tradition, length, frequency or duration of the program. O: Assessed health-related quality of life or well-being (global health-related quality of life, mental, physical, functional, social, and/or spiritual well-being) and/or psychological health (depression, anxiety, perceived stress, and/or psychological distress). If available, safety data were used as outcome measure.</td>
<td>C: Evidence found for short-term effects of yoga in improving psychological health in breast cancer patients. The short-term effects on health-related quality of life could not be clearly distinguished from bias. I: Yoga can be recommended as an intervention to improve psychological health during breast cancer treatment.</td>
<td>Primary limitation of review was the small total number of eligible RCTs; only studies that were published as a full paper were eligible. Therefore, the review might have missed RCTs that were unpublished or published as dissertation or abstract only. Only three RCTs included a long-term follow-up, so long-term effects could not be estimated for all pre-specified outcome measures, and the low number of included studies limited analyses.</td>
</tr>
<tr>
<td>Author, year</td>
<td>Study Objectives</td>
<td>Study design/ Participants</td>
<td>Level of Evidence</td>
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<tr>
<td>Li &amp; Goldsmith, 2012.</td>
<td>To synthesize results of human trials assessing the role of yoga in improving the signs and symptoms of stress and anxiety in groups including breast cancer patients.</td>
<td>Systematic review</td>
<td>I</td>
<td>$n = 7 - 131$</td>
<td>I: Frequency of yoga interventions varied from one week to five months. Ten out of 35 studies did not have a control group. O: Outcome measures focused on perceived stress, biochemical markers of stress, and anxiety.</td>
<td>C: Of 35 trials addressing the effects of yoga on anxiety and stress, 25 noted a significant decrease in stress and/or anxiety symptoms when a yoga regimen was implemented. Fourteen of the 35 studies reported biochemical and physiological markers of stress and anxiety; however, they yielded inconsistent support of yoga for relief of stress and anxiety.</td>
<td>Common limitations within the studies included small sample sizes, lack of randomization, and lack of control groups.</td>
</tr>
<tr>
<td>Author, year</td>
<td>Study Objectives</td>
<td>Study design/Participants</td>
<td>Level of Evidence</td>
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</table>
| Raghavendra, Nagarathna, Nagendra, Gopinath, Srinath, Ravi, Patil, Ramesh, & Nalini, 2007 | To determine whether a support group intervention based on mind/body and psycho-spiritual interventions such as yoga might be a viable alternative to standard supportive therapy and coping preparation in reducing the frequency and intensity of nausea and emesis in chemotherapy-naïve stage II and III breast cancer patients receiving adjuvant chemotherapy. | Randomized control trial (RCT) of women recently diagnosed with stage II and III breast cancer. | II                | n = 62 women, 30 to 70 years old, with operable stage II and III breast cancer receiving adjuvant chemotherapy with or without radiotherapy | I: Experimental group: n = 28, 30 minute yoga sessions before chemotherapy treatment. Audiotapes provided for home exercise, expected to be used a minimum of 3 hours a week.  
  Control Group: n = 34 supportive counseling; one 60 min. supportive counseling session before first chemotherapy treatment. Continued 30 min. counseling once every 10 days. Daily logs reporting nausea and vomiting.  
C: Yoga group, in comparison to the control group, reported a greater decrease in post-chemotherapy nausea and vomiting frequencies and intensities. Additionally, a greater decrease in intensity of anticipatory nausea and anticipatory vomiting. Improvement in QoL resulted in a decrease in level of distress, as well as decrease in intensity of symptoms of anxiety and depression.  
I: Yoga may be beneficial in decreasing post chemotherapy-related vomiting and nausea, anticipatory nausea and vomiting, as well as levels of distress, anxiety and depression.  
O:  
  • Morrow Assessment of Nausea and Emesis questionnaire (MANE)  
  • State Trait Anxiety Inventory (STAI)  
  • Beck’s Depression Inventory (BDI)  
  • Functional Living Index for Cancer (FLIC)  
  • Symptom Checklist Questionnaire | Management of delayed emesis was not in accordance to current guidelines. Participants in control group were offered supportive counseling and coping preparation less frequently than the experimental yoga group, which may account for significant differences between groups. Participants were pre-exposed to yoga intervention much sooner (during surgery and radiotherapy) before start of chemotherapy treatment. |
### Table 4: Summary of Evidence

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Study Objectives</th>
<th>Study design/ Participants</th>
<th>Level of Evidence</th>
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<th>Interventions and outcome measures</th>
<th>Summary of results (Conclusions and implications)</th>
<th>Study Limitations</th>
</tr>
</thead>
</table>
| Rao, Nagendra, Raghuram, Vinay, Chandrashekar, Gopinath, & Srinath, 2008a. | To determine the influence of yoga on mood states, distress, quality of life, and immune outcomes in early stage breast cancer patients undergoing surgery. | Randomized control trial (RCT) of women recently diagnosed with stage II and III breast cancer. | II | \( n = 69 \) women, between the age of 30 and 70, recently diagnosed with stage II or III breast cancer. | \( I: \) Four in-person intervention sessions; continue with home program upon discharge.  
- Experimental group: \( n = 33 \) integrated yoga program consisting of breathing exercises and yoga relaxation techniques. Sessions administered at patients’ bedsides before surgery and postoperatively. Group was prompted to keep daily logs about yoga practice, experience of distressing symptoms, medication intake, and diet.  
- Control group: \( n = 36 \) supportive counseling sessions, including education and social support, as well as postoperative rehabilitative shoulder exercises. Participants were invited to 60-minute introductory session prior to surgery where they received information about surgery, management of side effects, and shoulder exercises. | \( C: \) Results indicated experimental group experienced a significant decrease in anxiety states and traits, depression, and symptom severity and distress post-surgery when compared to the control group. Serum immunoglobulin measurements showed a significant decrease in IgA levels post-surgery in the yoga group. Higher levels of CD56% were also identified in the yoga group.  
\( I: \) The stress reduction and immune-enhancing benefits of engaging in a yoga intervention may reduce distress and immune suppression in the breast cancer population. | Assessment of only NK cell number and T lymphocyte subsets; Assessment of CD4, CD8, and NK cell % using immunohistochemistry rather than fluorescence-activated cell sorting; Types of patients who participated in the study, resulting in a limitation to generalize the results. |
Rao, Nagendra, Raghuram, Vinay, Chandrashekera, Gopinath, & Srinath, 2008b.

Determine the influence of yoga on postoperative outcomes and wound healing in early operable breast cancer patients undergoing surgery.

Randomized control trial (RCT) of women, between the ages of 30 and 70, who were recently diagnosed with stage II and III breast cancer and scheduled for breast cancer surgery.

II

n = 98 women who were recently diagnosed with stage II and III breast cancer.

I: Four in-person sessions
- Experimental group: Four in-patient sessions of an integrated yoga program focused on stress reduction and shoulder mobility improvement. Requested to continue with home yoga program.
- Control group: social support and shoulder restriction through exercise rehabilitation. Request to continue with home exercise program.

O: Recorded days of hospitalization; The interval between surgery and treatment; The days after surgery to suture removal; Observation; Two milliliters of blood samples

C: Length of hospital stay for experimental group < control group (p = 0.003). Days of drainage retention for experimental group < control group (p = 0.001). # of days for suture removal for experimental group < control group (p = .03). Plasma TNF alpha level following surgery for experimental group < control group (p = 0.001).

I: Having an active stress reduction component (i.e., yoga-based relaxation and breathing exercises), in addition to primary interventions, may improve the physiological recovery process in breast cancer patients and reduce complications.

O:
- State Trait Anxiety Inventory (STAI)
- Beck’s Depression Inventory (BDI)
- Functional Living Index of Cancer (FLIC)
- Subjective symptom checklist
- Immune Assays (blood samples)

Only one cytokine (TNF-Alpha) tested; TNF-Alpha only tested four weeks post-surgery; 29% attrition rate for follow up assessments; Limited nutritional information.
<table>
<thead>
<tr>
<th>Author, year</th>
<th>Study Objectives</th>
<th>Study design/Participants</th>
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<th>Study Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vadiraja, Rao, Nagendra, Nagarathna, Rekha, Vanitha, &amp; Rao, 2009.</td>
<td>To evaluate the effects of an integrated yoga program on quality of life and symptom control in early operable breast cancer patients undergoing adjuvant radiotherapy.</td>
<td>Randomized control trial (RCT), before and after of women with stage II and III breast cancer receiving adjuvant radiotherapy.</td>
<td>II</td>
<td>n = 88 women, between the ages of 30 – 70, with stage II and III breast cancer receiving adjuvant radiotherapy.</td>
<td>I: Experimental group: n = 44 integrated yoga program administered by a trained yoga therapist either before or after adjuvant radiotherapy; three one-hour sessions a week for six weeks with self-practice as homework on the remaining days.</td>
<td>C: The experimental group showed improvements in psychological distress, physical distress, decrease in fatigue and insomnia, increase in appetite, and decrease in pain, nausea and vomiting.</td>
<td>Inequality in contact time for control and experimental groups during interventions; Blinding yoga intervention was impossible.</td>
</tr>
<tr>
<td>Moadel, Shah, Wylie-Rosett, Harris, Patel, Hall, &amp; Sparano, 2007.</td>
<td>To examine the impact of yoga, including physical poses, breathing, and meditation exercises, on quality of life, fatigue, distressed mood, and spiritual well-being.</td>
<td>Randomized control trial (RCT), before and after of multiethnic women with new or recurrent stages I, II, or III breast cancer.</td>
<td>II</td>
<td>n = 128, multiethnic women, age 18 or older, new/recurrent breast cancer (stages I to III) diagnosed within five years, ability to speak</td>
<td>I: Experimental group experienced a greater decrease in fatigue, more energy, decrease in depressive symptoms, improvement in general health, decrease in pain, improvements in role function, and physical and social function when compared to the control group.</td>
<td>C: Experimental group not able to discern the therapeutic factors operating in yoga, such as social support, physical poses, or meditation. Inclusion of an appropriate comparison group (e.g., support group, etc.) is recommended.</td>
<td>Study not able to discern the therapeutic factors operating in yoga, such as social support, physical poses, or meditation. Inclusion of an appropriate comparison group (e.g., support group, etc.) is recommended.</td>
</tr>
</tbody>
</table>
being among multiethnic breast cancer patients. 

English or Spanish, and not actively practicing yoga. 42% African American, 31% Hispanic, and 23% Caucasian. 69% of patients not currently married. 

The intervention incorporated the following three major yoga components: physical stretches and poses, breathing exercises, and meditation. Patients were asked to practice yoga at home daily and given an audiotape/compact disk for guidance. 

- Control group: n = 44 waitlist for 12 weeks. 

O: 

- Functional Assessment of Cancer Therapy (FACT) 
- Functional Assessment of Cancer Therapy – General (FACT-G) 
- Functional Assessment of Chronic Illness Therapy – Fatigue 
- Functional Assessment of Chronic Illness Therapy – Spirituality 
- Distressed Mood Index 

I: Multiethnic breast cancer patients (stages I, II, and III) may improve QoL, social well-being, and spirituality, as well as exhibit a decrease in distress, through participation in yoga intervention. 

Exercise group) may help differentiate these factors. Limited to short-term effects of yoga, more research needed to determine long-term effects of yoga on QoL.
<table>
<thead>
<tr>
<th>Author, year</th>
<th>Study Objectives</th>
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<th>Study Limitations</th>
</tr>
</thead>
</table>
| Banerjee, Vadraj, Ram, Rao, Jayapal, Gopinath & Hande, 2007. | To examine the effect of an intensive and integrated yoga program on psychological and physiological stress in patients with breast cancer. | Randomized control trial (RCT), before and after, of women with recently operated breast cancer. | II | \( n = 58 \) women, age 30 to 70, with recently operated breast cancer. | I:  
- Experimental group: \( n = 35 \) yoga intervention program for six weeks, with sessions 90 minutes each. Program included meditative practice, followed by counseling and teaching of yoga-appropriate postures. Specific techniques were included for breast cancer, such as guided imagery for cancer cells. Later in treatment, intervention included group awareness and audio/video tools to practice at home.  
- Control group: \( n = 23 \) supportive counseling and encouraged to engage in light activity.  

O:  
- Hospital Anxiety Depression Scale  
- Perceived Stress Scale  
- Alkaline Single-cell gel Electrophoresis assay to test for DNA damage following radiotherapy treatment  
| C: In the experimental group, a significant decrease of anxiety and depression scores were seen when compared to the control group. Post-radiotherapy, depression and stress scores also decreased for the experimental group and were significantly less than the control group. DNA damage was significantly increased for both the yoga and control groups after radiotherapy; however, the post-radiotherapy damage was lower by 14% in the experimental group when compared with the control group.  
| I: An intensive and integrated yoga program may help decrease stress and anxiety for women with recently operated breast cancer, as well as potentially decreasing the percentage of DNA damage post-radiotherapy. | Limitations include the small sample size for the intended purpose of this study, the large number of dropouts from the control group, and the lack of activities given to the control group to account for the time and attention attributed to the intervention group. Additionally, no specific data collected on compliance with the home yoga program. |
### Table 4: Summary of Evidence

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Study Objectives</th>
<th>Study design/Participants</th>
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</tr>
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</table>
| Danhauer, Mihalko, Russell, Campbell, Fedler, Daley, & Levine, 2009. | To determine the feasibility of implementing a restorative yoga intervention for women with breast cancer and to examine group differences in self-reported emotional, health-related QoL and symptom outcomes. | Randomized control trial (RCT), before and after design of women with any stage of breast cancer. | II | n = 44 women diagnosed with breast cancer (any stage), with minimal experience in yoga. | I: Experimental group: n = 22 participated in a 75-minute restorative yoga program weekly for ten weeks (closed group). No home practice was required.  
• Control group: n = 22 placed on a waitlist. Group completed a questionnaire at the same intervals as the experimental group, at week zero and again at week ten.  
O:  
• SF-12 Health Survey  
• Functional Assessment of Cancer Therapy-Breast (FACT-B)  
• Functional Assessment of Cancer Therapy-Fatigue (FACT-F)  
• Functional Assessment of Cancer Therapy-Spirituality (FACT-S)  
• Center for Epidemiologic Studies Depression Scale (CES-D)  
• Pittsburg Sleep Quality Inventory  
• Positive and Negative | C: Group differences favored the yoga group for mental health, depression, positive affect, and spirituality. Significant baseline group interactions were also observed for negative affect and emotional well-being. Women with higher negative affect and lower emotional well-being at baseline derived greater benefit from the yoga intervention compared to those with similar values at baseline in the control group.  
I: Restorative yoga may be beneficial for women with any stage of breast cancer in the areas of mental health (i.e., depression, positive affect), spirituality, and fatigue. | Sample size was relatively small; Not clear whether the physical health, fatigue, and sleep outcomes were truly non-significant or limited by sample size to detect significant group differences; Multiple statistical comparisons; Study used waitlist group that did not control for time; Attention from teacher and social contact, which may have contributed to benefits; Sample group was heterogeneous in terms of treatment status; Sample was not demographically diverse. |
Determine physical and psychological benefits of yoga for breast cancer survivors.

Randomized control trial (RCT), before and after. Cancer survivors (18 years or older; not currently undergoing active treatment; no additional health concerns) 95% female, 80% married, 85% breast cancer survivors, approximately 56 months from the time of diagnosis.

\[ n = 38 \text{ cancer survivors (85% breast cancer survivors; 80% female).} \]

Affect Schedule
- Self-report questionnaire
- Intervention Adherence

I:
- Experimental group: 7-week yoga program, 75-minute sessions taught by certified yoga instructor.
- Control group: waitlisted

O:
- Profile of Mood States
- Symptoms of stress Inventory
- EORTC Quality of Life Questionnaire Core-30
- Leisure Score Index of the Godin Leisure-Time Activity Index
- Canadian Physical Activity, Fitness and Lifestyle Appraisal

C: Results from EORTC post-intervention: global quality of life for experimental group > control group \((p < .01)\), emotional function for experimental group > control group \((p < .05)\), diarrhea for experimental group < control group \((p < .01)\). Results from SOSI: improvements in emotional irritability, gastrointestinal symptoms, and cognitive disorganization for experimental group > control group \((p < .10)\). Results from POMS: improvements in total mood disturbances, tension, depression, and confusion for experimental group > control group \((p < .10)\). Both groups had experienced change in terms of physical activity.

I: Implementing yoga programs into the lives of breast cancer survivors may provide psychological benefits, as well as increased physical fitness over time.

Possible contamination of groups; Small sample size; Short program duration.
Bower, Garet, Sternlieb, 2011. To determine the effects of a yoga intervention on fatigue in women with breast cancer.

Mixed method, cohort, before and after design of women with persistent fatigue due to breast cancer.

III

$n = 11$ women with persistent fatigue, age 45 – 65 years old, originally diagnosed with stage 0-II breast cancer.

I: Yoga intervention conducted for 90 minutes, twice a week, for 12 weeks by a certified Junior Intermediate Iyengar Yoga teacher at her home studio. Props were provided if needed to avoid stress and tension. Breathing techniques were taught. No control group.

O:
- Fatigue Symptom Inventory (FSI)
- Beck Depression Inventory (BDI-II)
- Pittsburg Sleep Quality Index (PSQI)
- Breast Cancer Prevention Trial Symptom Scale (BCPT)
- SF-36
- Standardized physical function tests (8 foot walk, timed chair stands)

Qualitative weekly diaries and post-intervention interviews to evaluate individual perceptions of benefit and intervention efficacy.

C: Cohort experienced a decrease in fatigue, more energy, decrease in depressive symptoms, improvement in general health, decrease in pain, improvements in role function, as well as physical and social function.

I: Yoga may be beneficial for decreasing fatigue, depressive symptoms, and pain, while improving energy and role function, and physical and social function in women with breast cancer.

Small sample size; Sample exclusions due to co-morbidities, suggesting practice is better suited for higher functioning population; Lack of a control group; Factors, such as social support, may have influenced fatigue scores and expectations about treatment efficacy.
<table>
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<th>Author, year</th>
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<tr>
<td>Galatino, Greene, Daniels, Dooley, Muscatello, &amp; O’Donnell, 2012.</td>
<td>To determine the impact of yoga intervention on chemotherapy-related cognitive impairments, quality of life, and functional outcomes.</td>
<td>Mixed method, single case study, before and after design of four women diagnosed with stage I, II, or III breast cancer, recruited from centers in southern New Jersey, ages 44-65 years old.</td>
<td>III</td>
<td>n = 4 Caucasian women with stage I, II, or III breast cancer</td>
<td>I: n =4. Intervention was inspired by Iyengar yoga. Small group sessions and home based-program were provided 2x/week for the first six weeks and 1x/week for the last six weeks (12 weeks total). Each yoga session was approximately 70 minutes. The yoga sessions were delivered and taught by certified yoga instructors. The participants were given a mat, two chairs, two bolsters, two blankets, a belt, one eye bandage, a 1-lb weight, and two blocks. The props were only used as assistive devices as needed in order to ensure proper alignment and posture. No control group.</td>
<td>C: The CogState showed positive results for trends in speed, accuracy, and decrease in number of errors on the cognitive tasks, but none of the results were statistically significant. Results showed balance, flexibility, and improved quality of life with no adverse events observed. In terms of qualitative analysis, there was an overall consensus that yoga improved perceived quality of life, but did not result in any noticeable cognitive changes.</td>
<td>Possible improvements in balance due to chemotherapy-induced peripheral neuropathy, but was not assessed before, during, or after treatment; Co-intervention was not avoided, as some women participated in support groups; Sample was not demographically diverse.</td>
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<td>Hockett, 2005.</td>
<td>To determine the effectiveness of a comprehensive wellness program for women with breast cancer.</td>
<td>Cohort, before and after design of women recovering from breast cancer.</td>
<td>III</td>
<td>$n = 30$ females diagnosed with breast cancer, recovering from completed treatment within the timeframe of 3 weeks to two years without any active cancer.</td>
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<td>I:</td>
<td>Experimental group: 10-week comprehensive recovery program offered two times a week for a total of 20 sessions. The program included education, yoga, support group, and physical exercise.</td>
<td>Control group: placed on waitlist; filled out health surveys and questionnaires.</td>
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<tr>
<td>O:</td>
<td>Medical Outcomes Study Short Form-36</td>
<td>Cancer Related Fatigue Distress Scale</td>
<td>Mishel Uncertainty of Illness Scale</td>
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<tr>
<td>C:</td>
<td>Results from the Medical Outcomes Study Short Form-36: Means of the experimental group for all three scales – physical functioning, social functioning, and vitality – were higher than those of the control group. Results from the Cancer Related Fatigue Distress Scale: The experimental group showed a greater decrease in cancer-related distress than the control group. Results from the Mishel Uncertainty of Illness Scale: The experimental group showed a greater decline in the level of uncertainty from the pre- to post-test than the control group.</td>
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<td>Support groups and exercise programs, both components of yoga, may be beneficial in increasing physical functioning, social functioning and vitality, as well as decreasing the degree of uncertainty and declining cancer-related fatigue for breast cancer survivors.</td>
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Small sample size due to the lack of referrals of post-treatment survivors by healthcare providers; Sample was not ethnically diverse (i.e., primarily Caucasian women); Non-randomized selection; Very low generalizability.
To investigate the effects of yoga on treatment satisfaction and improving perceptions of social isolation by improving quality of life and decreasing stress and anxiety in women with breast cancer.

Before and after design of women with breast cancer between the age of 30 – 50, who have had at least six months pass since chemotherapy.

III

n = 20 women with breast cancer, between the age of 30 – 50, who have had at least six months pass since chemotherapy.

I: Eight sessions of classical yoga program, 2x/week. Provided information about classic yoga program and prepared patients for two sessions before main yoga program. Each session lasted one hour. No control group.

O:

- Nottingham Health Profile (NHP)
- State-Trait Anxiety Inventory (STAI-I, STAI-II)
- Visual Analog Scale (VAS)

C: Quality of life scores improved, trait and state of cancer-related anxiety scores both decreased significantly, and participants’ satisfaction of the exercises increased.

I: Yoga intervention may be beneficial in improving quality of life and decreasing cancer-related anxiety in women with breast cancer.

Research was first form of study in Turkey, which resulted in some skepticism; Validity and reliability of methods of measurement were not addressed or justified; No control group.
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| Hann, Baker, Denniston, & Entrekin, 2005. | To assess the use of complementary therapy (CT) for breast cancer survivors and their perceptions about the role of CT in recovery and prevention of cancer recurrence. The study also assessed the relationship between CT and quality of life. | Cohort design with female breast cancer survivors. | III               | n = 608 females diagnosed with breast cancer from a community center, Reach to Recovery. | I: A mail survey was completed by the sample group. The self-report questionnaire inquired about the use of various CTs, beliefs about CT, current life satisfaction, demographic characteristics, and cancer treatment history. No control group. | O:  
- Satisfaction with Life Domains Scale – Cancer (SLDS-C)  
- Self-Report questionnaire created by study authors and presented in nominal, ordinal, and Likert scales (Developed based on CT literature). | The Survey was done in 1999, and therefore attitudes towards CT and method types may have changed. The majority of the sample was white, married, and well educated. Study was also not replicable. Information regarding the participants’ use of chemotherapy prior to cancer diagnosis was not gathered, nor was their life satisfaction score prior to intervention. |
Results from SLDS – C: Statistical correlations between CT categories and SLDS-C scores were all statistically significant (p < 0.01); however, the correlations were all less than r < 0.10, which indicated no relationship between CT use and satisfaction with quality of life.

Although there was no significant correlation between CT and SLDS – C, the majority of participants perceived CT as giving them hope and helping them cope with stress.

I: Complementary therapy, including yoga, may be beneficial for clients’ perceived quality of life and overall satisfaction.
Summary of Qualitative Research

When synthesizing the quantitative studies, two of the fifteen studies had qualitative components incorporated within the results. According to Galatino, Greene, Daniels, Dooley, Musatello, and O’Donnell (2012), qualitative responses from the four participants in this longitudinal study demonstrated positive attitudes about the yoga intervention sessions. The qualitative measures addressed perceptions in how yoga sessions impacted their quality of life during chemotherapy, how the home-based yoga program affected their daily quality of life, what were the most difficult parts of engaging in the yoga classes, and if they noticed whether yoga affected any cognitive (memory) changes during or after chemotherapy.

Qualitative responses from participants in the Galatino et al. (2012) study primarily included a greater sense of self. Participants experienced a decrease in achiness and fatigue following the yoga interventions. Additionally, all participants were more relaxed from the breathing and stretching exercises that were incorporated into the yoga program. Most participants preferred the yoga class experience over the home based program, as they enjoyed the social support and positive energy from the other participants. Consequently, many of the participants experienced common, overarching barriers in relation to participating in the yoga sessions. These barriers included physical limitations such as pain, range of motion, and fatigue. Other themes regarded work schedules, time, and child care. In relation to the last qualitative measure on perceived cognitive changes, participants did not notice any significant changes in memory or cognition during or following the yoga intervention program. Despite overall consensus from the patients that yoga improved perceived quality of life in qualitative measures, components of the overall methodology were flawed and quantitative results lacked substantial evidence for the impact of yoga on cognition and quality of life. For this reason, results of this study and implications for practice should be cautioned in regards to using yoga intervention for cognitive gains.

In another study by Bower, Garet, and Sternlieb (2011), individuals kept weekly diaries in relation to the Iyengar yoga classes, in order to address qualitative measurements for the eleven participants involved in this cohort study. Common themes and comments were stated within the diaries to provide a representation of how yoga affected the study participants. Throughout the 12 week program, participants identified subtle physical and mental changes each week, experienced more energy and less fatigue, and generally expressed feeling better and stronger. It was also indicated that the cumulative effect of yoga had been noticeable to the participants. The results of this study suggest that yoga intervention plays an important role in patients’ perceived satisfaction and should be considered in conjunction with conventional treatment to help improve psychological symptoms and quality of life.
Implications

Implications for Consumers (Women diagnosed with breast cancer)

For individuals diagnosed with breast cancer, quality of life is a concern at any stage in the recovery process, whether they are about to begin treatment, are currently undergoing treatment, or are in the stages following treatment. The stress, anxiety, and pain associated with treatment and recovery can be overwhelming and detrimental to overall well-being. Individuals can try incorporating a yoga practice into their daily routines at their own pace and only focus on the components that work for them. They may find utility in the breathing techniques, gentle stretches, or the camaraderie they find by joining a yoga group. Most importantly, individuals should consult their physicians before beginning a routine to know their own personal precautions. They can also consult a physical or occupational therapist to learn more about how to adapt their routine to fit their personal goals. Individuals should keep in mind that the evidence does not suggest replacing their current cancer treatment with yoga, but rather it is recommended to be used as a complementary or adjuvant therapy aimed at lessening the severity of symptoms and overall improving quality of life.

Clinicians (Occupational and Physical Therapists)

Clinicians working with patients who have been diagnosed with breast cancer should always take a person-centered approach when selecting the best treatment options for their clients. Individual preference is essential to encouraging sustained motivation and participation. Yoga or components of a yoga program, such as meditation or breathing techniques, can be suggested to the patient as one possible method to improve quality of life in conjunction with conventional treatment. These techniques should be presented as options that have worked successfully in some, but not all, patients. Clinicians should not try to pressure patients into trying yoga if it does not fit with their individual values and beliefs about the recovery process. Clinicians can also help their clients find resources regarding yoga programs and help them adapt the programs to fit their specific physical and psychological needs.

Researchers

Summary of research limitations:
- Small sample population and lack of demographic diversity limits statistical power and generalizability
- Intervention duration is too short or too infrequent
- Possible contamination of control groups (i.e., control group participating in other form of exercise or support group, or even practicing yoga on their own)
- Lack of randomization for group selection process
• Participant’s previous yoga experience or beliefs surrounding yoga not addressed
• Differences in participants’ concurrent medical treatment not addressed (e.g. radiation treatment and chemotherapy vs. chemotherapy only)
• Lack of information regarding the postures and techniques used in the yoga programs, limiting ability to replicate the process

Recommendations for future research:
• Examine the benefits of yoga for different types of cancers
• Narrow the sample type to determine when a yoga intervention might be the most useful in the process (i.e., pre-treatment, during treatment, post-treatment)
• Explore other intervention control groups as compared to yoga (exercise group, meditation group, social support group)
• Explore the differences between yoga groups and practicing yoga alone as a home exercise program
• Ensure that the control group experiences the same level of camaraderie as the yoga intervention group to determine whether results are from practice of yoga or social support gained from group practice
• Make greater effort to reach out to minorities and underserved populations
• Conduct more qualitative studies to further examine the causal effects of yoga and why it is effective for some people and not others

Conclusion

While many of the studies we reviewed had significant limitations and leave room for further research, there is still strong evidence that yoga indeed improves the quality of life for many women who are living with breast cancer. Yoga is a cost-effective intervention with no drug interactions, and therefore serves as a potentially beneficial complementary therapy. Whether targeting the stress and anxiety that can accompany cancer treatment, pain and disturbed sleep patterns in the hospital, or the depression that may come after receiving a diagnosis, yoga can be offered as a possible intervention throughout the recovery process.
References


induced nausea and emesis in breast cancer patients. *European Journal of Cancer Care, 16*(6), 462-474.


