Yoga as an Alternative and Complementary Treatment for Cancer: A Systematic Review

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Abstract

Objectives: Cancer is an important public health concern, with millions of patients affected worldwide. Given the physical, psychological, and physiologic changes associated with cancer, holistic therapies are needed to treat all aspect of the disease.

Design: A systematic review was conducted to determine the efficacy of yoga as a treatment option for cancer since 2010. Included studies were published from January 2010 to July 2012 and were indexed in MEDLINE, CINAHL, and Alt HealthWatch.

Results: Thirteen studies met the inclusion criteria. Eight of these studies were performed in the United States, and one each was conducted in Slovenia, Italy, the United Kingdom, Canada, and Turkey.

Conclusions: The evidence for efficacy of yoga as an alternative and complementary treatment for cancer is mixed, although generally positive. Limitations of the reviewed interventions included a mixed use of instruments, weak quantitative designs, small sample sizes, and a lack of theory-based studies.

Introduction

The psychosocial factors associated with being diagnosed with cancer, as well as the physical and emotional stress of undergoing radiation therapy, chemotherapy, and surgery, demonstrate the complexity of the disease. In addition, the psychological stress that patients with cancer are subjected to can impede recovery. Patients have reported anxiety, depression, fatigue, and a loss of control due to cancer diagnosis and treatment. Coping with life-threatening illness and finding one's role in society and family life to be changed, possibly permanently, places strain on the cancer patient. Although radiation therapy and chemotherapy are necessary treatments to eliminate cancerous cells, these therapies cannot play a role in emotional recovery. Considering that cancer causes 13% of deaths worldwide, finding effective holistic approaches to cancer treatment is an urgent need.

Much of the recent research into complementary cancer treatments involves the role of physical activity. Researchers have reported, for breast cancer survivors at least, that levels of physical activity among this group is low. Yoga is an alternative, safe, low-impact exercise that combines meditation, breathing, and exercise. In addition, patients unable to participate in traditional exercise may find yoga's slow, gentle movements easier to perform. Many studies have reported increases in quality-of-life scores and a decrease in stress levels among cancer survivors participating in yoga programs versus wait-list controls. It is apparent that the yoga techniques used for thousands of years in India affect emotional well-being, but patients with cancer need a therapy that can treat them physically as well.

Researchers are now reporting the physiologic effects of yoga on patients with cancer. Patients who practice yoga regularly while undergoing chemotherapy have a statistically significantly smaller decrease in their natural killer cells during chemotherapy and less DNA damage than patients receiving coping therapy. In addition, yoga users had statistically significantly more natural killer cells at the end of treatment than the group receiving coping therapy. The potential effect of yoga for patients with a cancer diagnosis, as well as those in recovery, is something worth exploring.

The purpose of this review is to determine yoga's influence on the multidimensional factors associated with cancer diagnosis, treatment, and recovery. A meta-analysis on the effects of yoga on psychological health, quality of life, and physical health of patients with cancer was published in 2011. The meta-analysis included 10 studies conducted between 1970
and July 2010. The meta-analysis authors found that compared with control groups, the yoga groups showed significantly greater improvements in aspects of psychological health, such as anxiety reduction ($p = .009$), depression alleviation ($p = .002$), distress reduction ($p = .003$), and stress reduction ($p = .006$). However, because of the small and different types of studies, the authors concluded that the findings were preliminary. Therefore, it is worthwhile to determine the current evidence on the efficacy of yoga.

Research questions addressed in this study included the following: Since 2010, what new information has been learned about the efficacy of yoga to significantly reduce anxiety, depression, pain, sleep disturbances, and stress levels of patients with a cancer diagnosis, undergoing treatment, or in recovery? Since 2010, have sufficient data become available to enable conclusions about the efficacy of yoga in treating anxiety, depression, pain, sleep disturbances, and stress? Finally, since 2010, has yoga been shown to significantly improve the quality of life among patients with cancer?

**Materials and Methods**

This study used a systematic review of the literature on yoga as a therapy for the psychological and physical factors associated with cancer. To be included in this review, the study must have (1) been published in the English language; (2) been published between January 2010 and July 2012; (3) included any form of yoga as a part of or the entire intervention for treatment of cancer; (4) used any quantitative study design; and (5) measured anxiety, depression, sleep disturbances, pain, quality of life, and/or stress as an outcome (according to such instruments as State-Trait Anxiety Inventory, Beck Anxiety/Depression Inventory, visual analogue scale, and Nottingham Health Profile). Studies were excluded if they (1) did not use a quantitative design, (2) were incomplete or ongoing, or (3) were published in a journal not indexed in any of the following databases: CINAHL, MEDLINE, or Alt HealthWatch. Inclusion criteria for the past 2 years were deemed appropriate because a previous meta-analysis covered studies published from 1970 to 2010.3 Because yoga has been used for numerous disorders, including anxiety, stress, and depression, it was necessary to omit studies on these illnesses unless they were a secondary outcome of cancer diagnosis or treatment.

The three phases of the meta-analysis, returning studies meeting the above criteria, were a Boolean search, distillation, and manuscript and reference review (Fig. 1). To identify studies meeting these criteria, MEDLINE, Alt HealthWatch, and CINAHL were searched during phase I. Boolean operators and search terms used in the data extraction process included “yoga AND cancer AND intervention OR program.” Phase I resulted in 135 articles extracted from MEDLINE ($n = 49$), Alt HealthWatch ($n = 28$), and CINAHL ($n = 58$). Phase II included preliminary distillation of the articles by eliminating duplicates ($n = 15$), review or discussion articles ($n = 8$), studies that did not incorporate a quantitative design ($n = 35$), studies that were still in progress ($n = 5$), and studies that did not focus on tertiary treatment of cancer ($n = 34$). As part of phase III, three researchers independently reviewed the refined list of articles ($n = 38$). In phase III, articles that did not incorporate anxiety, depression, sleep disturbances, pain, quality of life, and/or stress as an outcome measure were omitted ($n = 25$). The remaining 13 articles satisfied the eligibility criteria.

**Results**

Table 1 summarizes the year of publication, authors, study design, sample size, age of participants, intervention modality/dosage, and salient findings of the 13 included studies. The studies are listed in ascending order by year of publication.

**Discussion**

The aim of this review was to determine the efficacy of yoga as an alternative or complementary treatment for the psychological and physical factors associated with cancer from studies published between January 2010 and July 2012. These include pain, sleep disturbances, mental well-being, fatigue, stress, anxiety, and depression, as well as quality of life. The 13 studies that met the inclusion criteria were performed in the United States ($n = 8$), Slovenia ($n = 1$), Italy ($n = 1$), United Kingdom ($n = 1$), Canada ($n = 1$), and Turkey ($n = 1$). Of the 13 studies reviewed, 11 reported significant changes in the psychological or physical functioning of the participants.2–12

Six of the studies used a randomized controlled design.1,2,5,9,11,12 This type of study is considered the most rigorous because it enlists pre- and post-tests, randomly assigns participants to a control and an experimental group, and minimizes threats to internal and external validity. One such randomized controlled trial reported that the physical component scores of a quality-of-life questionnaire (scale, 0–100) increased by 10.7 points for the yoga group, whereas the wait-list group scores decreased by 4.4; this difference was both statistically and clinically significant.2 It is important to note, however, that trait anxiety, fatigue, sleep disturbances, and depression remained stable over time between groups, with no significant changes. This finding counters the suggestion that yoga can act as a holistic approach to cancer.

In another randomized controlled trial, emotional well-being, fatigue, and cortisol levels improved significantly in the yoga group compared with the control group ($p < .05$).5 Furthermore, in another study, scores on the Rosenberg Self-Esteem Scale revealed a significant improvement in the yoga group versus the control group after the intervention ($p < .0005$).1 Another study found that dosage played a role in improvements in quality-of-life scores; participants who had attended 24 or more yoga classes had statistically significant changes versus controls ($p < .05$).12 It is difficult to draw conclusions regarding the mixed results of these randomized controlled trials, but other, less costly, designs do exist.

A pretest–posttest design is the least costly and simplest, but it cannot minimize threats to internal validity, such as maturation and history, because such studies lack a control group for comparision. This review examined six studies that used this design.4,6–8,13,14 One such study reported improvements in Nottingham Health Profile scores for pain, emotional level, sleep, social adaptation, physical skills, and level of energy ($p < .05$).7 In addition, State-Trait Anxiety Inventory scores improved ($p < .05$) compared with baseline data.7 An additional pretest–posttest study reported similar significant results for depression and general health improvements at the end of the intervention; these results.
persisted during the 3-month follow-up. These results are promising, but because the studies did not include a group for comparison, such as physical activity or coping therapy, they cannot determine whether the benefits of yoga outweigh those of other alternative treatments.

Similar to randomized controlled design, quasi-experimental studies do assign participants to a control and an experimental group, but not randomly. This sometimes occurs when the researchers seek to match participants between groups or when random selection is not ethical. One study in the meta-analysis enlisted this type of design. This study showed that the yoga group's scores for well-being significantly improved over those of the dance therapy group. Results such as these should allow for conclusions to be drawn, but unfortunately, small sample size and the existence of few studies for comparison make it difficult to determine the true benefits of a yoga regimen to treat the primary and secondary outcomes of cancer.

As found in a study previously mentioned, dosage of yoga may play just as important a role as the yoga therapy itself. Program durations ranged from a one-time inpatient 45-minute yoga session to a 2-year yoga program taught for 2 hours at 5-day intervals, with home practice twice daily encouraged. Durations in the other studies included 1 week, 3 weeks, 4 weeks, 6 weeks, 8 weeks, 12 weeks, and 6 months. One study did not specify duration of the yoga program. All studies used a trained instructor for the duration of the intervention, for a weekly class with encouraged home practice, or for a one-time/one weekly training session. The use of an instructor can alleviate issues with self-reporting and ensure that participants are performing yoga correctly. Conversely, it can add to attrition rates as well as increase the cost of an intervention. The duration and dosage needed for sustained regular yoga to act as a beneficial therapy for patients with cancer have yet to be determined.

Limitations of this review include small sample sizes, few studies meeting the inclusion criteria, multiple primary and secondary outcomes of cancer measured, and diverse use of instruments. However, it is important to note the advantage of measuring so many outcomes. Because yoga has been empirically tested in many of the secondary outcomes of cancer
<table>
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<tr>
<th>Study, year</th>
<th>Design and sample</th>
<th>Age (y)</th>
<th>Intervention modality</th>
<th>Intervention dosage</th>
<th>Salient findings</th>
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<tr>
<td>Chandwani et al., 2010&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Randomized controlled design; 61 women with stage 0–III breast cancer currently undergoing radiation therapy, assigned to yoga or wait-list group (by age, disease stage, time since diagnosis, type of surgery, prior chemotherapy, and depression and anxiety scores)</td>
<td>&gt;18</td>
<td>Patanjali’s yoga sutras of 8 major techniques (Ashtanga, Asanas, Yama and Niyama, Pranayama, and Pratyahara, Dharana, Dhyana, and Samadhi)</td>
<td>Up to two 60-min yoga sessions weekly for 6 wk and 60-min CD with manual for encouraged practice at home and at the hospital after radiation therapy</td>
<td>Physical component scores on aspects of quality of life reveal that for general health perceptions, scores in yoga group increased by 10.7, while score in wait-list group decreased by 4.4 ($p = .005$); physical function scores in yoga group increased by 5.2 and scores in wait-list group decreased by 7.3 ($p = .04$) (from baseline to 3 mo); trait anxiety, fatigue, sleep, and depression remained stable over time ($p$ not significant)</td>
</tr>
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<td>Speed-Andrews et al., 2010&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Pretest–post-test design; 24 breast cancer survivors</td>
<td>&gt;18</td>
<td>Iyengar yoga</td>
<td>2 programs; fall/winter met 22 times over 12 wk and spring met 12 times over 6 wk for 90 min of yoga</td>
<td>Mean changes for generic quality-of-life scores reveal that improvements were found (using paired t-test) in bodily pain ($p = .024$), vitality ($p = .033$), role-emotional ($p = .010$), and mental component ($p = .045$) scores; changes were not statistically significant but were clinically meaningful (overall score increased by 8.9)</td>
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<td>Thygeson et al., 2010&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Pretest–post-test design; 11 children and 5 adolescents with a diagnosis of cancer or blood disorder and 33 parents from 2 inpatient hematology/oncology units</td>
<td>7–12 13–18</td>
<td>Postures based on basic principles of Hatha yoga</td>
<td>1-time inpatient 45-min yoga session</td>
<td>State-Trait Anxiety Inventory scores showed no change in anxiety among children, a reduction in adolescents from 41 to 28 points, and a reduction in parents from 45 to 33 points ($p &lt; .01$)</td>
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<td>Ulger and Yağlı, 2010&lt;sup&gt;7&lt;/sup&gt;</td>
<td>Pretest–post-test design; 20 patients who had undergone chemotherapy for breast cancer at least 6 mo past</td>
<td>30–50</td>
<td>Classical yoga (unspecified)</td>
<td>8 sessions of 2 twice-weekly yoga taught by an instructor for 1 h</td>
<td>On Nottingham Health Profile, reported improvements in pain, emotional level, sleep, social adaptation, physical skills, and level of energy ($p &lt; .05$); State-Trait Anxiety Inventory scores also improved ($p &lt; .05$)</td>
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<td>Banasik et al., 2011&lt;sup&gt;5&lt;/sup&gt;</td>
<td>Randomized controlled design; 18 female survivors of stage II–IV breast cancer at least 2 mo post-treatment assigned to a yoga or nonintervention control group</td>
<td>63.33 ± 6.9</td>
<td>Iyengar yoga</td>
<td>Twice-weekly 90-min yoga session for 8 wk</td>
<td>Emotional well-being, fatigue, morning cortisol levels (ng/dL), and 5 p.m. cortisol levels for yoga vs. control groups significantly different after intervention ($p &lt; .05$)</td>
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<tr>
<td>Bower et al., 2011&lt;sup&gt;8&lt;/sup&gt;</td>
<td>Pretest–post-test design; 11 female breast cancer survivors with persistent fatigue</td>
<td>46–65</td>
<td>Iyengar yoga</td>
<td>90-min sessions twice weekly for 12 wk</td>
<td>Fatigue Symptom Inventory scores from 63.2 ± 1.1 to 2.7 ± 1.6 ($p &lt; .01$), Beck Depression Scale depressive symptoms scores from 15.4 ± 8.0 to 7.6 ± 6.2 ($p &lt; .01$), and general health from 65.0 ± 22.1 to 65.0 ± 22.1 ($p &lt; .01$), all from baseline to 12 wk; all persisted significantly at 3-mo follow-up ($p &lt; .01$)</td>
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<td>Geyer et al., 2011&lt;sup&gt;13&lt;/sup&gt;</td>
<td>Pretest–post-test design; 4 parents/caregivers, 3 children with acute</td>
<td>5–10, 19, 15, and</td>
<td>Bendy Kids’ Yoga</td>
<td>5 sessions over once weekly for 1 hr</td>
<td>Pediatric Quality of Life Inventory™ scores significantly changed for child physical</td>
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<td>Kovačić and Kovacić, 2011</td>
<td>Lymphoblastic leukemia, 1 adolescent with acute lymphoblastic leukemia, 1 adolescent with Ewing sarcoma, 1 adolescent with Fanconi anemia</td>
<td>12</td>
<td>Both groups received a 1-wk physiotherapy; yoga class then attended a training yoga session and received an audiocassette for home practice for 3 wk</td>
<td>Both groups received a 1-wk physiotherapy; yoga class then attended a training yoga session and received an audiocassette for home practice for 3 wk</td>
<td>Function perception ($p &lt; .05$); child emotional function, parent emotional function, and child social function improved ($p = $ not significant)</td>
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<tr>
<td>Messina et al., 2011</td>
<td>Randomized controlled design; 32 women with primary diagnosis of breast cancer (stage I and II) assigned to a yoga or a control group</td>
<td>&gt;40</td>
<td>Yoga in Daily Life®</td>
<td>2 h of teaching at 15-d intervals, 15 min (at least) twice daily of yoga independent of an instructor (2 y)</td>
<td>Rosenberg Self-Esteem Scale scores statistically significantly differed at week 4 after attendance for yoga group ($p &lt; .0005$)</td>
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<tr>
<td>Selman et al., 2012</td>
<td>Quasi-experimental design; 18 patients assigned to a dance therapy or a yoga group</td>
<td>46–88</td>
<td>Kriya yoga</td>
<td>6 once-weekly 90-min yoga classes with an instructor</td>
<td>Survival for patients with IL-2+MLT+yoga was significantly higher than for supportive care ($p &lt; .001$), supportive care+yoga ($p &lt; .005$), MLT+yoga ($p &lt; .01$), and IL-2+MLT ($p &lt; .05$) groups; tumor regression was 80% in patients treated with MLT+yoga+IL-2 vs. 55% in IL-2+MLT ($p &lt; .05$), 30% in MLT+yoga ($p &lt; .025$), and 22% in MLT ($p &lt; .01$) groups.</td>
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<td>Dhruva et al., 2012</td>
<td>Randomized controlled design; 23 patients undergoing chemotherapy assigned to a yoga or a wait-list group</td>
<td>56±11.9</td>
<td>Sivananda yoga (Nidra, Pranayama, Mudras, and Asanas)</td>
<td>Weekly classes and encouraged at-home practice 10–15 min twice daily</td>
<td>Well-being scores were significantly improved for yoga group ($p &lt; .05$) but not for dance therapy group; concern scores improved for both yoga (0.97) and dance therapy (0.85) groups</td>
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<td>Galantino et al., 2012</td>
<td>Pretest–post-test design; 4 women with early-stage breast cancer</td>
<td>44–65</td>
<td>Viniyoga (Hatha therapeutic style)</td>
<td>12 wk of yoga session meeting twice weekly for 6 wk, then once weekly for 6 wk for 70 min</td>
<td>In the yoga group, sleep disturbance ($p = .04$) and Hospital Anxiety and Depression Scale anxiety scores ($p = .04$) improved significantly; for every 1 h of yoga practiced, the quality-of-life scores improved by a specific coefficient found for each subscale (e.g., depression, stress, physical component)</td>
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<tr>
<td>Littman et al., 2012</td>
<td>Randomized controlled design; 63 women completing breast cancer treatment at least 3 mo before being assigned to a yoga or a control group</td>
<td>33–74</td>
<td>Iyengar-inspired yoga program</td>
<td>Once-weekly 75-min facility-based yoga class and at least 4 more d of at-home practice with CD/DVD/booklet for 6 mo</td>
<td>Quality-of-life score (fatigue and breast cancer–related), improved significantly for group that attended ≥ 24 yoga classes vs. control group ($p &lt; .05$)</td>
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IL, interleukin; MLT, melatonin.
and in the primary disease in other studies, this allows for a multitude of studies to examine. Yoga has been tested in patients with depression, anxiety, sleep, chronic pain, and stress, and it is possible that these studies may contribute to determining the efficacy of yoga for patients with cancer.

Conclusion
Cancer claims an estimated 7.4 million lives each year worldwide. The confounding influences of psychological strains impedes physical recovery and the benefits of traditional treatment practices. This systematic review identified few studies on cancer and yoga, so no decisive conclusions can be made regarding yoga’s role in cancer treatment. This review highlights the current programs being instituted, but without additional rigorous studies comparing not only control groups but other alternative therapies, the true benefits of yoga, while promising, are still undetermined.

Disclosure Statement
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References

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