Utilizing Yoga in Oncologic Patients Treated with Radiotherapy: Review

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Abstract

Purpose: Several trials on noncancer population indicate that yoga is associated with meaningful clinical effects. This study evaluated the physical and psychosocial outcomes of yoga in oncologic patients treated with radiotherapy. Methods: We focused on a research through Cochrane Register of Controlled Trials (CENTRAL), BioMed Central, and MEDLINE studies up to May 2017. Results: Yoga was found to have a substantial benefit in cancer patients’ distress, anxiety, and depression. It also demonstrated a moderate impact on fatigue and emotional function and a small and insignificant effect on functional well-being and sleep disturbances. As far as the effects on psychological outcomes are concerned, there was insufficient evidence. Conclusions: This systematic review of randomized controlled trials showed that yoga has strong beneficial effects on oncologic patients’ quality of life. Results of the current review must be interpreted with caution due to the relative small sample sizes of most of the included studies, while a prospective randomized study stands in need for the confirmation of our results.

Keywords: Radiotherapy, review, yoga

Introduction

The role of radiation therapy (RT) is particularly important for the treatment of many malignancies, since ~60% of cancer patients receive RT as a part of their therapeutic regimen.1 The RT success depends on the type of cancer, the anatomic affected site, the tumor staging, and the presence of comorbidities. The RT acute and late side effects are of concern, as they can significantly influence the quality of life (QoL).2 The most common symptoms experienced by patients are mainly pain, anxiety, depression, sleep disturbance, nausea, vomiting, diarrhea, and decreased appetite. The sequelae may continue for a long period even after the RT has ended.3 Many treated patients decide to use complementary and alternative medicine techniques as an attempt to alleviate their disturbances.4,5

Yoga is considered as a “mind–body” exercise due to the combination of physical action with breathing and meditation.6 It is recognized as the sixth most commonly used alternative health practice among the U.S. adults and it stands as a complement to standard medical care treatment.7 Although no scientific evidence exists, yoga can help protect and support patients’ physical, mental, and spiritual strength.8 Nowadays, yoga appears to be very popular among cancer patients because it is thought to help manage cancer-related symptoms.9 Several studies in the noncancer population

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reported positive effects of yoga on physical and psychological outcomes.\textsuperscript{[10-15]}

The aim of the present study is to conduct a systematic review of the effects of yoga in cancer patients and survivors who underwent RT, focusing particularly on both physical and psychosocial benefits.

\section*{Methods}

The key words used for the search were: “Yoga”, “Radiotherapy”, “Randomized Controlled Trial,” and synonyms. A literature review was performed based on database search in Cochrane Register of Controlled Trials (CENTRAL), BioMed Central, and MEDLINE up to May 2017.

Study inclusion criteria were as follows: (a) design: randomized controlled trial (RCT), (b) population: adults >18 years old, with any cancer diagnosis either during or posttreatment, (c) intervention: yoga, (d) control group: nonexercise, (e) outcome: physical and psychosocial results, and (f) text language: English.

The search of the literature identified thirty-six (36) papers. Thirty-three (33) publications were excluded after the study of their summaries, as they were not related to “Benefits of yoga in cancer patients and survivors: A systematic review of randomized controlled trials \[\text{Figure 1}\].”

The quality rating of included studies was based on the Cochrane Risk of Bias Tool. The quality of the studies was high [\text{Figure 2}].

\section*{Results}

From a review of all published studies up to February 2017, a total of 155 oncologic patients (sample sizes ranged from 44 to 58), treated with RT, were evaluated. They were randomly assigned to receive yoga or brief supportive therapy prior to RT treatment [Table 1].

This systematic review described and evaluated three papers examining yoga as a practice to improve psychosocial symptoms in oncologic RT patients. The study included only RCT focusing on yoga interventions with physical postures and evaluating the effectiveness on psychosocial outcomes.

Through our research, yoga was found to be a feasible modality in oncologic patients treated with RT. Beneficial effects on several physical and psychosocial symptoms and a small impact on functional well-being were reported.

Vadiraja \textit{et al.}\textsuperscript{[16]} compared the results of a 6-week integrated yoga program with the effects of a brief supportive therapy as a control intervention in early operable breast cancer patients undergoing adjuvant RT. The mean age of participants was 46 years in yoga arm group \((N_y)\) and 48.45 years in control arm group \((N_c)\) \((N_y = 44, N_c = 44)\). Paired sample \(t\)-test done to assess within-group change showed a statistically significant decrease in self-report anxiety scores in the \(N_y\) \((t = 7.24, P < 0.001)\) and \(N_c\) \((t = 2.15, P = 0.04)\) following intervention. Analysis of covariance on postintervention measures using baseline anxiety as a covariate showed a significant decrease in self-report anxiety in the yoga group compared with controls \((F (1, 73) = 15.4, P < 0.001))\). Paired
Effects of an integrated yoga program with brief supportive therapy on distressful symptoms in breast cancer outpatients undergoing adjuvant RT

Eighty-eight Stage II and III breast cancer outpatients were randomly assigned to receive yoga (n=44) or brief supportive therapy (n=44) prior to their RT treatment. Intervention consisted of yoga sessions lasting 60 min daily while the control group was imparted supportive therapy once in 10 days. Assessments included EORTCQoL (C30) functional scales and PANAS. Assessments were done at baseline and after 6 weeks of RT treatment.

Yoga might have a role in managing self-reported psychological distress and modulating circadian patterns of stress hormones in early breast cancer patients undergoing adjuvant RT. There was a significant difference across groups over time for positive affect, negative affect, and emotional function. There was a significant improvement in positive affect, emotional function, and cognitive function, and decrease in negative affect in the yoga group as compared to controls.

The results suggest beneficial effects of yoga intervention in managing cancer- and treatment-related symptoms in breast cancer patients.

The present study highlights the potential of an outpatient yoga-based program and supportive counseling to reduce adverse effects of the conventional treatment modality and to benefit cancer patients’ overall survival.

For some outcomes, yoga yielded better subjective and objective results than either stretching or usual care.

There were fewer differences between active stretching and waitlist groups.

Sample t-test done to assess within-group change showed a significant decrease in self-report depression within the Nc (t = 6.26, P < .001) and N (t = 3.23, P = 0.01). Analysis of covariance on postintervention measures using baseline depression scores as a covariate showed a significant decrease in self-report depression in the N intervention compared with Nc (F[1, 73] = 10.7, P = 0.002). Paired sample t-test done to assess within-group change showed a significant decrease in perceived stress in the Nc group compared with N (t = 5.5, P < 0.001) but not in the N (t = 1.42, P = 0.17). Analysis of covariance on postintervention measures using baseline perceived stress score as a covariate showed a significant decrease in perceived stress in the N intervention group from a mean of 8.5 (standard deviation [SD] = 1.6) at baseline to a mean of 4.1 (SD = 1.0) (48.2%) after the 6-week yoga program. In the Nc group, the mean anxiety score increased from 8.2 (SD = 1.1) to 10.5 (SD = 1.8) (28%). Based on repeated ANCOVA measures, controlling for baseline values of each dependent variable, the change in anxiety was significantly different between the groups (P < 0.001). The post-RT depression score for the intervention group decreased from a mean of 8.0 (SD = 1.9) at baseline to a mean of 3.4 (SD = 0.5) (57.5%) after the yoga program. In the Nc group, the score increased from 7.8 (SD = 0.9) at baseline to 9.7 (SD = 1.2) (24%). Based on repeated ANCOVA measures, controlling for baseline values of each dependent variable, the change in depression was significantly different between the groups (P < 0.001). In the N intervention group, the mean PSS decreased from 20.4 (SD = 2.8) at baseline to 14.9 (SD = 2.4) post-RT (26.9%), whereas the Nc showed no change pre- and post-RT ([mean = 19.0, SD = 2.1] at baseline.

Table 1: Characteristics of selected studies

| Author and year of publication | Sample size | Purpose | Patients and methods | Conclusions |
|-------------------------------|-------------|---------|----------------------|-------------|
| Vadira et al., 2009[16]       | 44          | Effects of an integrated yoga program with brief supportive therapy on distressful symptoms in breast cancer outpatients undergoing adjuvant RT | Eighty-eight Stage II and III breast cancer outpatients were randomly assigned to receive yoga (n=44) or brief supportive therapy (n=44) prior to their RT treatment. Intervention consisted of yoga sessions lasting 60 min daily while the control group was imparted supportive therapy once in 10 days. Assessments included EORTCQoL (C30) functional scales and PANAS. Assessments were done at baseline and after 6 weeks of RT treatment | Yoga might have a role in managing self-reported psychological distress and modulating circadian patterns of stress hormones in early breast cancer patients undergoing adjuvant RT. There was a significant difference across groups over time for positive affect, negative affect, and emotional function. There was a significant improvement in positive affect, emotional function, and cognitive function, and decrease in negative affect in the yoga group as compared to controls. The results suggest beneficial effects of yoga intervention in managing cancer- and treatment-related symptoms in breast cancer patients. |

| Banerjee et al., 2007[17]    | 58          | Effects of an integrated yoga program in modulating perceived stress levels, anxiety, as well as depression levels | Fifty-eight breast cancer patients undergoing RT were studied, two psychological questionnaires - HADS and PSS | The present study highlights the potential of an outpatient yoga-based program and supportive counseling to reduce adverse effects of the conventional treatment modality and to benefit cancer patients’ overall survival. For some outcomes, yoga yielded better subjective and objective results than either stretching or usual care. There were fewer differences between active stretching and waitlist groups. |

| Chandwani et al., 2010[18]  | 53          | Previous research incorporating yoga into RT for women with breast cancer finds improved QoL | Patients with breast cancer Stages 0 to III were recruited before starting RT and were randomly assigned to yoga (n=53) or stretching (n=56) three times a week for 6 weeks during XRT or waitlist (n=54) control Self-report measures of QOL, fatigue, depression, and sleep quality, and five saliva samples per day for 3 consecutive days were collected at baseline, end of treatment, and 1, 3, and 6 months later | The results suggest beneficial effects of yoga intervention in managing cancer- and treatment-related symptoms in breast cancer patients. Yoga might have a role in managing self-reported psychological distress and modulating circadian patterns of stress hormones in early breast cancer patients undergoing adjuvant RT. There was a significant difference across groups over time for positive affect, negative affect, and emotional function. There was a significant improvement in positive affect, emotional function, and cognitive function, and decrease in negative affect in the yoga group as compared to controls. The results suggest beneficial effects of yoga intervention in managing cancer- and treatment-related symptoms in breast cancer patients. |

Sample t-test done to assess within-group change showed a significant decrease in self-report depression within the Nc (t = 6.26, P < .001) and N (t = 3.23, P = 0.01). Analysis of covariance on postintervention measures using baseline depression scores as a covariate showed a significant decrease in self-report depression in the N intervention compared with Nc (F[1, 73] = 10.7, P = 0.002). Paired sample t-test done to assess within-group change showed a significant decrease in perceived stress in the Nc group compared with N (t = 5.5, P < 0.001) but not in the N (t = 1.42, P = 0.17). Analysis of covariance on postintervention measures using baseline perceived stress score as a covariate showed a significant decrease in perceived stress in the N intervention group from a mean of 8.5 (standard deviation [SD] = 1.6) at baseline to a mean of 4.1 (SD = 1.0) (48.2%) after the 6-week yoga program. In the Nc group, the mean anxiety score increased from 8.2 (SD = 1.1) to 10.5 (SD = 1.8) (28%). Based on repeated ANCOVA measures, controlling for baseline values of each dependent variable, the change in anxiety was significantly different between the groups (P < 0.001). The post-RT depression score for the intervention group decreased from a mean of 8.0 (SD = 1.9) at baseline to a mean of 3.4 (SD = 0.5) (57.5%) after the yoga program. In the Nc group, the score increased from 7.8 (SD = 0.9) at baseline to 9.7 (SD = 1.2) (24%). Based on repeated ANCOVA measures, controlling for baseline values of each dependent variable, the change in depression was significantly different between the groups (P < 0.001). In the N intervention group, the mean PSS decreased from 20.4 (SD = 2.8) at baseline to 14.9 (SD = 2.4) post-RT (26.9%), whereas the Nc showed no change pre- and post-RT ([mean = 19.0, SD = 2.1] at baseline.

PANAS: Positive and negative affect schedule, HADS: Hospital Anxiety and Depression Scale, PSS: Perceived Stress Scale, EORTCQoL: European Organization for Research in the Treatment of Cancer-QoL, QoL: Quality of life, RT: Radiotherapy, XRT: Radiotherapy.
and [mean = 20.4, SD = 2.5] post-RT). The authors concluded that yoga intervention modulates the stress levels in breast cancer patients during RT.

Chandwani et al.[18] evaluated the hypothesis that participation in yoga three times a week during RT would have long-term effects on physical and mental health aspects of QoL (primary end points), fatigue, depression, and sleep (secondary end points) relative to an active stretching or waitlist control groups (N_y = 53, N_stretching = 56, N_waitlist = 54). The mean age of all participants was 51.9 years. The authors concluded that, for some outcomes, yoga yielded better subjective and objective results than either stretching or usual care. There were fewer differences between active stretching and waitlist groups.

**Discussion**

The present study demonstrated that yoga has large beneficial effects on distress, anxiety, and depression; moderate beneficial effects on emotional function; and a small effect on sleep disturbance. Psychosocial effects, cognitive function, vigor, anger, hostility, spirituality, relaxation, and mental health were also studied, therefore the evidences of yoga’s effects on them are insufficient.

Future prospective RCTs stand in need, to evaluate the effects of yoga on (a) physical status, (b) psychosocial situation, (c) the optimal frequency, (d) duration of yoga, (e) in types of cancer different from breast cancer, and (f) the optimal time point in the cancer and cancer treatment or rehabilitation trajectories for offering yoga interventions.

**Conclusion**

The present study has some limitations. We included articles published only in the English language and we may have missed important findings from yoga in Asia, in which yoga practicing is much more common than in Western countries. However, in this retrospective study, we included two trials that were conducted in Asia. We should note that evidence of physical effects of yoga was generally insufficient to draw firm conclusions, because of the limited number of studies per physical result. Nevertheless, the small effect of yoga on physical function and functional well-being maybe related to the short intervention duration. To improve physical function and fitness, longer duration of intervention may be required.

This systematic review of RCTs showed that yoga has an important beneficial effect on cancer patients’ distress, anxiety, and depression; a moderate effect on fatigue and emotional function; and an insignificant effect on functional well-being and sleep disturbances. Regarding the effects on psychological outcomes, there was insufficient evidence. Results of the current review must be interpreted with caution due to the relatively small sample sizes of most of the included studies.

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**Conflicts of interest**

There are no conflicts of interest.

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