Yoga as an Adjuvant for Cancer Patients in India

Research Article

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Abstract: Though Yoga has originated in India, its scientific use to alleviate the sufferings of cancer patients in India is thin. There are very few published studies on yoga intervention for cancer patients from India. The objective of this review was to analyze the studies that have used yoga as an adjuvant for cancer treatment. Literature searches were made in PubMed, CINAHL, Google Scholar, Proquest and Science Direct for retrieving the related studies. Data were analyzed according to the objective. The compiled results show that yoga and pranayama interventions for cancer patients in India focused mostly on psychological aspects like anxiety and depression. Few studies have explored deep into the mechanisms by which the interventions produce the desired effects. Only very few researchers have analyzed the genetic or biochemical changes that occur in the human body as a result of practicing yoga. Currently, the focus is generally on breast cancer. Researches with yoga and pranayama as an adjuvant for other cancers also need to be experimented.

Keywords: Yoga • cancer • complementary therapy • India

1. Introduction

More and more people in India are getting diagnosed with cancer. People perceive treatment of cancer itself as a threat because it is long term and is associated with side effects and complications. Cancer diagnosis is associated with a lot of anxieties, worries and financial implications. Patients and families turn to complementary therapies to control the side effects of cancer treatment and to gain the mental power to undergo treatment. One of the most sought after complementary therapies is Yoga.

Yoga, for the Indian seers, was a means to experience the divinity within oneself by strengthening the body and taming the mind. It was first collated by Patanjali in his Yoga Sutras. Yoga was not merely an exercise but it was a way of living for the seers. Practicing yoga helped them to achieve a reflective and coherent state of the mind.¹

In recent times, researchers concentrated on the health benefits of yoga; both physical and mental. There was recent recognition of Yoga as a method to improve health by declaring an International Yoga Day on June 21st.

2. Significance of the Review

Though yoga originated in India, not many studies have been done on its effectiveness in cancer patients of India. The current literature shows that many of the yoga interventions among cancer patients are done in countries other than India. Based on this background, the researchers have taken up a review to explore the recent yoga/pranayama interventions done for cancer patients in India. Limited studies have been conducted in this area with diverse objectives and results. This review combined the different benefits of yoga on cancer from available literature.

3. Methodology-Review of Literature

An extensive search was made in databases like Pubmed, CINAHL, Science Direct, Proquest and Google Scholar for the last ten years (2007 to 2017). Yoga, Pranayama, cancer, neoplasms and India were the keywords used.

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The selection criteria included publication in peer-reviewed journals, studies published in the last 10 years, studies with full-text available, written in English only and studies done in India. There were a total of 659 articles out of which 644 were excluded for not qualifying the inclusion criteria or because they were repeated in different databases. Assessing the methodological rigor of the included studies were not within the scope of this article.

4. Results and Discussions

The evidences regarding yoga as an intervention on cancer patients in India and its benefits summarized out of the 15 articles are given below under different headings.

4.1. Benefits of yoga as an adjuvant

4.1.1. Controlling Anxiety

Anxiety is a response to the perception of danger, actual or anticipated. It alerts the individual so that the individual is prepared. It is a well-known fact and observation that cancer diagnosis and its treatment produce tremendous amount of anxiety among the patients.²

Yoga seems to have helped in controlling the anxiety of cancer patients. Both anxiety states and anxiety trait of cancer patients are influenced by Yoga throughout cancer treatment, that is, following surgery and during and after chemotherapy and radiotherapy. Yoga practice for six months or more have been found to reduce the state and trait anxiety among cancer patients. The patients selected in this study were women with stage II and III breast cancers. Anxiety was measured using the State Trait Anxiety Inventory (STAI). Asanas, pranayama (voluntarily regulated nostril breathing), meditation and yogic relaxation techniques with imagery were practiced by the intervention group whereas the control group received routine intervention with education during the course of treatment.³

Another study assessed the state and trait anxiety using STAI among breast cancer patients. The intervention group received pranayama (voluntarily regulated nostril breathing) and yogic relaxation techniques whereas the control group received supportive therapy. There were 45 patients in the intervention group and 53 patients in the control group. The control group of patients received supportive therapy. The intervention started before surgery and extended four weeks after the surgery. Though both the groups showed a reduction in anxiety state following

surgery, there was a significant decrease in anxiety states following surgery [$F(66) = 4.22$, $P = 0.04$, 95% CI (-5.6 to -0.3)], in the yoga group as compared to control group.⁴

In another similar study, sixty eight breast cancer patients were randomized into control group and experimental group where the experimental group received integrated yoga program for six weeks. The experimental group practiced meditation, yoga, pranayama and nidra during the six weeks, while the control group received supportive counselling. Hospital Anxiety and Depression Scale was administered to assess anxiety and depression among the patients. There was significant difference in the anxiety scores between the groups (4.1 ± 1 in experimental group and 10.5 ± 1.8 in the control group) at the end of integrated yoga intervention; the anxiety scores reduced considerably in the yoga intervention group (8.5 ± 1.6 to 4.1 ± 1), while the scores increased from baseline in the control group (8.2 ± 1.1 to 10.5 ± 1.8).⁵

4.1.2. Controlling Depression

Depression is a response to loss, actual or threatened, real or fantasized. Cancer patients experience depression during the course of treatment. For some, the sadness and hopelessness reaches the level requiring psychiatric interventions. Yoga was effective in decreasing depression scores and perceived stress scores among cancer patients undergoing surgery. Beck's Depression Inventory (BDI) was used to assess depression before and after surgery. There was significant reduction in depression in breast cancer patients who practiced Yoga and Pranayama [$F(66) = 7.6$, $P = 0.008$, 95% CI (-4.6 to -0.73)].⁴

In Banerjee et al.'s study among breast cancer patients, significant reduction in depression scores (8 ± 1.9 to 3.4 ± 0.5) were observed among the experimental group. Depression was assessed using Hospital Anxiety and Depression Scale. Between group comparison showed depression scores as 8 ± 1.9 for the experimental group and 9.7 ± 1.2 for the control group after the integrated yoga intervention.⁵

Yoga intervention is effective for reducing depression scores among cancer patients throughout treatment, that is, following surgery, before and after radiotherapy and before and after chemotherapy. Newly diagnosed breast cancer patients were randomized into control group and experimental group. Women who were diagnosed with operable breast cancer, were recruited prior to surgery. They were followed up for 24 weeks during radiation therapy or chemotherapy

or both. The intervention group received lectures on how to manage stress, practice with yogic postures, pranayama, yogic relaxation and meditation, while the control group received supportive therapy. There was significant reduction in the scores of depression after surgery ($F(65) = 7.06, P = 0.01$), before radiation therapy ($F(62) = 7.77, P = 0.007$), and after radiation therapy ($F(62) = 17.35, P < 0.001$) in the group which practiced yoga.⁶

4.1.3. Governing Emotions

Emotions are strong feelings that come out of one's situations. Cancer patients are highly emotional following the diagnosis. Yoga has shown significant improvements in positive affect, emotional function and cognitive function and decrease in negative affect, in the breast cancer patients undergoing radiotherapy.⁷

A study done by Chakrabarty et al. observed that pranayama influenced the emotions of women with breast cancer. Those who practiced pranayama during radiation therapy could handle emotions in a better way. The study was conducted as a randomized controlled trial in which the experimental group of women practiced pranayama during radiotherapy and the control group of patients received conventional treatment. Women who practiced pranayama expressed less worry and anxiety.⁸

4.1.4. Controlling Stress and its related hormones

Cortisol is an enzyme that is used to indicate the level of stress in the human body. Cortisol has a circadian release rhythm and the levels are thought to be the highest during early morning. Yoga and pranayama was found to be effective in decreasing the salivary cortisol levels among cancer patients undergoing radiation therapy.⁹ In another study among breast cancer patients after surgery, there was significant reduction in stress in patients who practiced yoga and pranayama.⁴

4.1.5. Limiting Nausea and Vomiting

Chemotherapy is one of the standard treatments for most of the cancers. Chemotherapeutic drugs target the rapidly multiplying cancer cells of the body. During the course of treatment, they also attack the rapidly multiplying normal cells of the body. Hence, the occurrences of nausea, vomiting and mucositis are high among patients receiving chemotherapy. Yoga

intervention during the course of chemotherapy has helped to reduce the rate of nausea and vomiting. There was significant reduction in the severity and frequency of nausea among breast cancer patients who performed yoga during chemotherapy.¹⁰

4.1.6. Better wound healing

Rao et al., in their study, argued that yoga practice resulted in better wound healing and improved post-operative outcomes in women with breast cancer after surgery. There was significant decrease in the duration of hospital stay, days of drain retention and days for suture removal in the breast cancer patients who performed yoga.¹¹

4.1.7. Controlling the Oxidative Stress

Yoga's role was experimented for oxidative stress as well. Oxidative stress is caused when the body fails to detoxify the free radicals generated in the body. It can be a result of cancer or its treatments. Oxidative stress is significantly elevated in retinoblastoma (RB), which is the most common primary intraocular malignancy of infancy and childhood. It can be measured by several markers.

In a study done in All India Institute of Medical Sciences, New Delhi, fathers of children with retinoblastoma were compared with fathers of normal children. Oxidative markers in sperm were compared between the two groups. The levels of reactive oxygen species in the semen were 1.5-times higher (36.086 ± 1.83 vs. 20.51 ± 2.71 RLU/s/million; $p > 0.01$) in the fathers of children with retinoblastoma compared to the fathers of normal children. Oxidative stress markers like reactive oxygen species (ROS), DNA fragmentation index (DFI) and 8-hydroxy-2'-deoxy guanosine (8-OHdG) were reduced in the sperm sample of fathers of children with retinoblastoma after they practiced yoga and pranayama for two hours each day for six months.^{12,13}

Protein thiols and glutathione control the oxidative stress. The levels of these chemicals were elevated in women with breast cancer who practiced pranayama while on treatment. Disulphide bonds formed by the thiols during oxidative stress help to control free radicals thereby reducing the toxicities of treatment.¹⁴ In another article, Chakrabarty et al. has reported that breast cancer patients experienced less fatigue when they practiced pranayama during the radiation therapy. 55% of these women had stage 2 breast cancer and 43.75%

had stage 3 breast cancer. Cancer-related fatigue was assessed using the cancer fatigue scale. The scale had 18, 11 point scales to measure fatigue in physical and functional aspects, affective and cognitive areas.¹⁵

4.1.8. Controlling the DNA damage

Apoptosis is a method of programmed cell death, which helps in maintaining the health of the body. A study that compared the apoptotic index (AI) and qualitative DNA damage (QDD) between breast cancer patients, advanced yoga practitioners and normal healthy volunteers found the percentage of apoptosis lower in the yoga practitioners. Percentage of comet cells as a result of DNA damage was highest in the cancer patients and least in the senior yoga practitioners.¹⁶ In another study, Banerjee et al. claimed that the DNA damage was slightly lesser in the yoga group post radiotherapy.⁵

4.1.9. Helps in immune regulation

Swami Ramdev Yoga sequence has been proved to affect the gene expression of chronic lymphocytic leukemia patients. Stress-related signaling pathways such as AK, BC, NM BX, R- 26 and hCG ($p = 0.034$) increased in practitioners of seven sequences of Swami Ramdev Yoga than the comparison group. The authors reasoned that the observed increase possibly suggests a prolonged life span of WBCs by inhibition of apoptosis. They have also claimed that the upregulation of antiapoptotic Bcl-2 along with Cox-2 gene expression in lymphocytes of Swami Ramdev Yog group put forward a better immune regulation by prolonging the lifespan of lymphocytes in the practitioners.¹⁷

In Rao et al.'s study, yoga interventions showed lesser decrease in the CD count and lower levels of serum IgA among breast cancer patients undergoing surgery.⁴ Inflammatory marker and tumor necrosis factor was decreased in early operable breast cancer patients practicing yoga as well.¹¹

4.2. Types of cancers that utilized yoga:

Yoga is tested for cancer patients in India with varied outcomes. Most of the yoga interventions in India are done in breast cancer patients. After breast cancer diagnosis, the patients usually undergo surgery, chemotherapy, radiation therapy and hormonal therapy. Depending on the stage of the disease and the presence of other markers, the sequence of the treatments might

differ. Few patients may not undergo all modalities as well. However, so far breast cancer is chosen for yoga interventions, probably because breast cancer patients are not physically incapacitated during the course of treatment and most of them will be able to perform yoga except in advanced stages. Patients with other cancers like head and neck cancers may need a modified yoga program. In such patients, physical impairments involving oral cavity, lips and so on will make it difficult for them to perform the exercises in the traditional ways especially the breathing exercises. Patients with cancers of bone, sarcomas and lymphomas may also find difficulty in assuming different postures of yoga. Yoga was tried during all modalities of treatment with different outcome measures like anxiety, depression, nausea, vomiting and fatigue. Few studies have tried yoga interventions for childhood cancers.¹⁸ There was only one study that tested the effectiveness of yoga intervention for leukemia patients.

Data presented in Table 1 show that most of the studies are done among breast cancer patients of South India. Asanas, pranayama and meditation were employed by many studies.

4.3. Side effects/difficulties in implementation:

None of the studies have reported any side effects related to yoga and pranayama. The difficulties in implementing the intervention were also not reported by the authors. Few authors have reported that they were flexible with the posture when the patients performed Pranayama as they allowed patients to sit on the chair instead of sitting on the floor.

5. Conclusion

Yoga and pranayama interventions were effective as an adjuvant for relieving psychological symptoms among the cancer patients of India. There was decrease in anxiety and depression scores among those who practiced yoga along with treatment. Cancer related fatigue, which is a debilitating but less focused side effect of cancer, was also reduced by yoga. Since the mechanisms leading to anxiety, depression and fatigue are multifactorial; it is difficult to isolate one particular molecular mechanism as a reason that yoga would have influenced. Few studies have explored deep into the mechanisms by which yoga interventions produce the desired effects. More and more genetic and biochemical studies with yoga as an intervention are needed to unravel the secret behind yoga and to contribute to the

Table 1: Details of Yoga Interventions on Cancer Patients of India.

Authors	Types of Cancers	Variables	Interventions	Year
Banerjee et al	68 Breast cancer patients	Anxiety, depression, perceived stress and DNA damage	Meditation, imagery, asanas, pranayama, yoga nidra during radiotherapy	2007
Raghavendra et al	62 Breast cancer patients during chemotherapy	Chemotherapy induced nausea and emesis	Set of asanas, pranayama, meditation and yogic relaxation techniques with imagery	2007
Rao et al	98 Breast cancer patients following surgery	Post-operative outcomes, plasma cytokines and wound healing	Pranayama and yogic relaxation	2008
Raghavendra et al	88 Breast cancer patients during radiotherapy	Anxiety, depression, perceived stress and diurnal salivary cortisol	Set of asanas, pranayama, meditation and yogic relaxation techniques with imagery	2009
Rao et al	98 Breast cancer patients	State and trait anxiety	Set of asanas, pranayama, meditation and yogic relaxation techniques with imagery after surgery, during and after chemotherapy	2009
Vadiraja et al.	88 Breast cancer patients during radiotherapy	Quality of life and affect	Set of asanas, pranayama, meditation and yogic relaxation	2009
Kumar & Balkrishna	Leukemia patients	Gene expression and stress-related signaling pathways	sequence of seven pranayama by Swami Ramdev	2009
Ram et al	9 each of Carcinoma breast patients; Advanced yoga practitioners; and Normal healthy volunteers.	apoptotic index (AI) and qualitative DNA damage	Asanas, pranayama and meditation	2013
Chakrabarty et al	160 Breast cancer patients undergoing radiation therapy	Levels of serum protein thiols and glutathione in breast cancer patients	Pranayama	2013
Rao et al	98 Breast cancer following surgery, radiation therapy and chemotherapy	Self-reported depression scores	Set of asanas, pranayama, meditation and yogic relaxation techniques with imagery	2015
Chakrabarty et al	160 Breast cancer patients undergoing radiation therapy	Cancer related fatigue	Pranayama	2015
Chakrabarty et al	160 Breast cancer patients during radiotherapy	Emotional aspects	Pranayama	2016
Dada et al	131 Fathers of children with retinoblastoma	ROS, DNA extraction, 8OHdG and DFI in semen	Asanas and Pranayama	2016

scientific knowledge. Currently, the focus is generally on breast cancer. Yoga has to be tried out in patients with other cancers also to test the tolerance and its benefits among them.

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