

Role of Yoga in Cancer Patients: Expectations, Benefits, and Risks: A Review

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Abstract

Background: The diagnosis and treatment of cancer poses severe psychologic distress that impacts functional quality of life. While cancer directed treatments are directed purely against tumor killing, interventions that reduce treatment related distress and improve quality of life are the need of the hour. Yoga is one such mind body intervention that is gaining popularity among cancer patients. **Method:** Several research studies in the last two decades unravel the benefits of yoga in terms of improved mood states, symptom reduction, stress reduction and improved quality of life apart from improving host factors that are known to affect survival in cancer patients. However, several metaanalysis and reviews show equivocal benefits for yoga. In this review, we will study the Yoga interventions in cancer patients with respect to expectations, benefits and risks and analyse the principles behind tailoring yoga interventions in cancer patients. **Results:** The studies on Yoga show heterogeneity with varied types of Yoga Interventions, duration, exposure, practices and indications. It also elucidates the situational context for reaping benefits and cautions against its use in several others. However, there are several reviews and bibliometric analysis of effects of yoga; most of them have not enlarged the scope of their review to cover the basic principles behind use of these practices in cancer patients. **Conclusion:** This review offers insight into the principles and practice of yoga in cancer patients.

Keywords: Cancer, clinical utility, meditation, risks, yoga

INTRODUCTION

Both diagnosis and treatment of cancer pose physical and psychological threats to the patient. Cancer patients normally receive multimodal treatments over a long period with accompanying cumulative morbidity.^[1,2] Treatment regimens for cancer can pose serious side effects for these patients such as change in appearance, infertility, altered sexual functioning, hair loss, fatigue, nausea and vomiting, pain, infections, and low blood counts, which grossly affect the patients overall functional quality of life (QOL).^[3-5] Fear and anxiety associated with invasive treatment procedures, sexual dysfunction secondary to surgery and radiation, and problems associated with extended hospital care and aggressive medical treatment are among the most common causes for the treatment-related side effects observed in cancer patients. The advances in cancer detection and treatment have improved survival rates for most of the cancers with majority of them surviving with cancer for a longer time than ever before.

However, surviving with cancer means a constant reminder about the disease, anxiety about recurrence and progression, and impending death.^[6] This coupled with treatment-related side effects can lead to intrusive thoughts and feelings of anxiety, hopelessness and helplessness and can cause severe psychologic distress.^[7-9] There sets in a vicious cycle of anxiety/stress, vasomotor, and pain symptoms that further reduce the patient's ability to tolerate pain and symptoms. This process is catalyzed by situational stressors and daily worries which the cancers patients have to contend reducing their threshold for these symptoms.^[10] This leads to increased dependency on medications that come with their accompanying

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How to cite this article: Rao RM, Amritanshu R, Vinutha HT, Vaishnaruby S, Deepashree S, Megha M, *et al.* Role of yoga in cancer patients: Expectations, benefits, and risks: A review. Indian J Palliat Care 2017;23:225-30.

Access this article online

Quick Response Code:



Website:
www.jpalliativecare.com

DOI:
10.4103/IJPC.IJPC_107_17

side effects. This treatment-related distress can manifest as anxiety or depressive disorders in some of these cancer patients leading to a state of heightened helplessness/hopelessness, lack of will to survive, loss of control over one's lives, change in attitude toward cancer and survival,^[6,11-14] decrease in threshold for pain and discomfort,^[15-17] and low self-esteem.^[18] Studies have also shown that such a state of mind can lead to sleep disturbances, aberrant cortisol rhythms, poor antitumor immune response, decrease in overall and disease-free survival with early relapse/recurrence, and heightened distress.^[19-22] Both treatment-related side effects and associated distress act as a potent short-term and long-term stressors constantly influencing patients to make lifestyle changes to cope and adjust with these problems and seek supportive care.

Oncologists and health professionals working with these patients recognize the need to intervene to break this vicious symptom-distress-symptom cycle. Growing evidence suggests that psychosocial and psychoeducational interventions are beneficial adjunctive treatments for patients with cancer.^[23-25] These interventions increase perceived control, decrease the potential stigma associated with cancer and having a "psychiatric problem," and provide a supportive environment where patients can allay their fears and concerns.^[26,27] Psychosocial interventions decrease depression and anxiety and increase self-esteem and help patients adopt active-approach coping strategies.^[28-30] In addition, QOL, immune status, and in some cases these programs have enhanced survival times.^[23,31,32]

Stress management techniques that have proven helpful include progressive muscle relaxation,^[33,34] diaphragmatic breathing,^[33,34] guided imagery,^[33,34] and social support.^[35,36] Participating in intervention programs before treatment have enabled patients to tolerate therapy with fewer reported side effects.^[37,38] Stress-reduction methods are many and varied, and yoga is especially attractive as it combines many of these techniques with simple stretching exercises, breathing, and relaxation techniques that could be useful for patients with cancer.

A growing literature shows the potential benefits of practicing yoga. Yoga is an ancient discipline and its physical and mental health benefits have been described in early texts.^[39,40] Although it has been used in India for centuries,^[33,34] it has recently started to gain global recognition.

Yoga is an ancient Indian science and is one among the six great Indian philosophies that have evolved over thousands of years. In the spiritual dimension, yoga is a path toward attainment of superconscious states beyond sensory perception and knowledge. It deals with the physical, mental, moral, and spiritual well-being of an individual.^[41] References to yoga are made throughout the Vedas, (ancient Indian scriptures that are among the oldest texts in existence).^[39,40] The earliest systematic description of this practice and various philosophies was codified into 196 aphorisms in the classic treatise the "Yoga Sutras" of Patanjali, dating back to 900 B.C.,^[39,40,42] which helped to define the modern practice of yoga.^[43] In his

aphorisms, yoga has been defined as "citta vrtti nirodhah" a practice of "controlling of the mind" by a systematic 8-fold path called Astanga Yoga. This pragmatic description enumerates eight stages of yoga, which if practiced systematically allows one to attain a state of sublimation of all mental modifications in the mind and superconsciousness (Samadhi). These systematic yoga techniques include Yama's (moral doctrines), Niyamas (disciplines), Asanas (postures), Pranayama (regulated nostril breathing/breath control), Pratyahara (introspection/in drawing mind away from perceptible external sensory stimuli), Dharana (concentration), Dhyana (meditation), and finally to attain a state of Samadhi (absorption).^[41] Attainment of such a contemplative absorptive state has been elucidated to confer a blissful state of mind and body. Similar references to these practices can be found in Buddhist scriptures who equate these yogic practices to mindful exercises. This is also popularly known as mindfulness-based stress reduction (MBSR) program.

World over, the term yoga usually refers to the third and fourth limbs, "Asana" and "Pranayama," although traditionally the limbs are viewed as interrelated. It is important to note that each of these approaches represents a distinct intervention, in the same way that psychodynamic, cognitive-behavioral, and interpersonal therapies each involve different approaches to psychotherapy.^[44]

The first four limbs—Yama, Niyama, Asana, and Pranayama—are considered external cleansing practices that help prepare the mind for internal practices Pratyahara (sense control), Dharana (concentration), and Dhyana (meditation). However, other traditional schools of yoga such as hatha yoga envisage cleansing practices called Kriyas. These cleansing practices are a precursor to asanas and pranayama, ensure proper circulation, digestion, and correct metabolic imbalances that affect flow of prana to all parts of the body.^[45,46] The asanas improve flexibility and strength and keep these channels open, whereas pranayama facilitates movement of prana across these channels. The asanas and pranayama together help keep the mind calm and prepare the mind to overcome sensory stimulus, reduce the thoughts by helping one to focus and concentrate, and finally relax in meditative states that ensure relaxation response and feeling of well-being. Although there are several other benefits and practices of yoga associated with spiritual upliftment and liberation, we discuss only those that have been used to promote health in cancer patients.

However, ancient Indian yoga scriptures have alluded that each of these eight limbs (steps) affect different aspects of health. Psychosomatic phenomena of disease as proposed in Western psychology is in consonance with Panchakosa theory of existential states according to Upanishads. Accordingly, a holistic concept of health has been proposed in the Upanishads which states that every human being has five existential states.^[40] The gross physical body or Annamaya kosa with organs and systems, the subtle functional body or Pranamaya kosa responsible for all physiological functions, the mind with

thoughts and emotions as the Manomaya kosa, the intellect or the reasoning as Vignanamaya kosa, and finally the inherent blissful states of awareness called the Anandamaya kosa. The psychosomatic phenomena of disease is explained as a change in perception and ignorance in Vignanamaya Kosa leading to mental turmoil or stress in Manomaya kosa which percolates as physiological changes in the Pranamaya kosa to finally culminate in organic changes in the physical body or Annamayakosa. Using different yoga practices to act at all five levels, we can correct the imbalances at each of these kosas and restore the homeostasis. For example, we use asanas and kriyas at Annamaya kosa level, pranayama at Pranamaya kosa, relaxation and meditation at Manomaya kosa level, counseling at Vignanamaya kosa, and finally by increasing ones internal awareness of these levels with these practices and relaxing we attain deeper states of bliss which is responsible for restoring the homeostasis by bringing relaxation response.

There are several studies that have used various forms and schools of yoga that tend to lay emphasis on either one or more of the above practices popular among them being Iyengar Yoga, Integrated Approach of Yoga Therapy, Sudarshan Kriya Yoga, Vinyasa Yoga, Tibetan Yoga, Integrated Yoga, and Hatha Yoga, etc. Unlike the Eastern traditions, Meditation is considered different from Yoga in the West; popular among them being MBSR and transcendental meditation, etc.

These yoga traditions have been increasingly used in cancer patients to reduce stress, mood states, and symptom distress and improve QOL. We elucidate the psychologic benefits and symptom reduction effects of various yoga interventions and their mechanism of action.

MOOD STATES AND PSYCHOLOGIC DISTRESS

Several studies have shown yoga to reduce self-reported depression, anxiety state, and trait in cancer patients undergoing cancer-directed treatment as well as in survivors.^[47-50] Various review articles validate the effects of yoga to have a moderate effect in modulating mood states such as anxiety, depression, and psychologic distress.^[48,51,52] Anxiety reduction effects of yoga are primarily due to pranayama and relaxation techniques,^[53] whereas antidepressant effects have been attributed to hyperventilation breathing techniques such as Bhastrika, Kapalabhati, and Ujjayi pranayama.^[54,55] Apart from these asanas or postures are known to reduce psychologic distress and contribute to anxiolytic and antidepressant effects. In a majority of the studies, the duration of the yoga program varies between 4 weeks to 12 weeks with a minimum of two supervised classes per week and home practice on remaining days. A recent Cochrane review has shown yoga to have moderate-quality evidence for reducing depression, anxiety and fatigue, when compared with psychosocial/educational interventions.^[56] In another review, yoga showed moderate-to-large effect for psychosocial outcomes.^[51] In contradiction, another review showed no significant benefits for anxiety, depression, distress, and sleep.^[48]

Meditative movement therapies such as Yoga, tai Chi, and Qi Gong showed to favor health-related QOL in cancer patients.^[57]

SYMPTOM MANAGEMENT

Yoga has been used in the management of a variety of symptoms such as fatigue, sleep disturbances, loss of appetite, chemotherapy-induced nausea and vomiting (CINV), and pain in cancer patients.^[56,58] The effects of yoga intervention have been moderate to large in these studies. Cooling Pranayama such as Sheetal, Sheetakari, and Sadanta have been useful in managing CINV along with Pavanamuktasana (supine knee-chest) and Uttana padasana (straight leg raise).^[58] Loosening exercises, gentle stretches, Yogasanas (stretching postures), Sudarshan kriya, and relaxation techniques have been shown to be effective in managing fatigue, pain, and sleep problems.^[59] Techniques that use postures intersped with relaxation techniques (cyclic meditation/movement meditation) have been found to be useful in reducing stress and improving sleep.^[60] Mind sound resonance technique that involves chanting and meditating on sound “a,” “u,” and “m,” and mantras have been shown to reduce fear, anxiety, and instill restful state of mind.^[61] Other schools of yoga that have used props to facilitate stretching followed by relaxation have also found to reduce fatigue and pain in cancer patients.^[62] The asanas chosen for managing symptoms depend on the direction of flow of prana according to Pancha Prana theory. For example, for managing CINV, the problem lies in the correcting Samana vayu whose seat is in the stomach and gut, sluggishness of this vayu causes abdominal discomfort and increase in Udana vayu (upward force) causing vomiting. The use of antiemetic therapy causes gastroparesis and obstructs Udana vayu and Apana vayu (downward force) causing nausea. By doing postures that work on abdomen, we facilitate the downward flow of the otherwise sluggish Apana vayu that reduces nausea and improves appetite. Similarly, fatigue is caused due to sluggish Samana vayu and obstructed flow of vyana that causes myalgia and fatigue on exertion. Various modules of yoga can be tailored to meet the needs of cancer patients. Some of these modules for various symptoms are given in Table 1.

MECHANISM OF ACTION OF YOGA INTERVENTION

Apart from the physical benefits of yoga as described above, reduction in stress hormones, HPA axis regulation, relaxation response, and improved parasympathetic function are known to reduce stress and modulate response to stressors and instill a greater control over situations.^[63,64] This is particularly useful in cancer patients who perceive cancer as a threat and constantly ruminate on its fears. For example, depression causes abnormal diurnal cortisol elevations that can affect sleep and cause insomnia and immune suppression.^[19,21] By changing perceptions and reactivity to situations and reducing intrusive thoughts a reduction in depressive symptoms have been seen. This in turn translates to reduction in cortisol peaks that is known to reduce fatigue, improve sleep, and

Table 1: List of Yoga practices for the management of Cancer Related Symptoms

	Fatigue	CINV	Constipation	Head and neck	General Stress/QoL	Myofascial pain (Upper extremity)	Myofascial pain (Lower extremity)	Pre Surgery/ Post Surgery	Headache
Loosening exercise- Upper extremity	✓	x	x	✓	✓	✓	x	✓	✓
Loosening exercise lower extremity	✓	x	✓	x	✓	x	✓	✓	✓
Breathing exercises	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hand and shoulder stretch Breathing	✓	x	x	✓	✓	✓	x	✓	✓
Ardhakatichakrasana	✓	✓	✓	✓	✓	✓	✓	✓	✓
Padahasthasana	✓	x	✓	x	✓	✓	x	✓	✓
ArdhaChakrasana	✓	x	✓	✓	✓	✓	✓	✓	✓
Trikonasana	✓	x	x	x	✓	✓	✓	✓	✓
Uttanapadasana	x	x	✓	x	x	x	✓	x	✓
Pavanamuktasana	x	x	✓	x	x	x	✓	✓	✓
Sethubandasana	x	x	✓	x	x	x	✓	x	x
Bhujangasana	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ardhashalabhasana	✓	✓	✓		✓	✓	✓	✓	✓
Shashankasana+m Kara chanting	✓	✓	✓	✓	✓	✓	✓	✓	✓
Yogic breathing	✓	✓	✓	✓	✓	✓	✓	✓	✓
Relaxation techniques*	✓	✓	✓	✓	✓	✓	✓	✓	✓
Slow pranayama*	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cooling Pranayama*	✓	✓	x	✓	✓	✓	✓	✓	✓
Pranayama *	✓	✓	✓	✓	✓	✓	✓	✓	✓

Special practices such as Cyclic Meditation, Mind Sound resonance Technique for all conditions& Mind Imagery Relaxation Technique

consequent immune response. Yoga is known to modulate this psychoneuroendocrine and psychoneuroimmune axis thereby restoring homeostasis and reducing the allostatic load.^[63,65] These effects have been observed in numerous studies of yoga that have shown reductions in cortisol, inflammatory cytokines,^[66,67] and improved natural killer cell counts.^[63,68,69] These changes have been shown to modulate distressful symptoms and improve QOL of these patients.

CONTRAINDICATIONS OF YOGA INTERVENTIONS

Although yoga is useful in improving fitness and health in both healthy and disease populations, caution is advised while dealing with cancer patients due to their disease condition and increased propensity for injury. None of the earlier studies with yoga in cancer patients reported side effects following yoga intervention. However, bone metastases in long bones present an increased risk of fracture with some asanas, especially in the elderly population. Second, hyperventilation practices have been shown to cause pneumothorax earlier,^[70] the chances of this is high in patients with lung cancer or lung metastases undergoing radiotherapy. Patients having pleural effusion, ascites, abdominal surgeries, etc., need a more cautious approach with yoga interventions, slow deep breathing, pranayama, and relaxation techniques being useful in these conditions. The performance status and general condition of the patient are of paramount importance while selecting yoga interventions.

Yoga is a promising mind-body intervention for integration in an oncology setting. However, most of the studies with yoga and meditation intervention have been done on breast cancer patients. We need to evaluate the effects of these interventions in other solid malignancies, head and neck, lung and cervical cancer patients that form a major burden of cancer in the country. We also need to evaluate the effects of this intervention under different treatment scenarios. Yoga is a feasible intervention used to reduce symptom burden and improve QOL in cancer patients. However, studies are needed to evaluate its cost-effectiveness.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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