

THE IMPACT OF BREATHING EXERCISES ON CANCER-RELATED FATIGUE IN PATIENTS UNDERGOING RADIATION THERAPY

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ABSTRACT

Cancer-related fatigue (CRF) is a prevalent and debilitating side effect of cancer and cancer treatment. This review will examine the scope of CRF and critically analyse exercise interventions to combat CRF in cancer patients undergoing treatment. Aerobic exercise interventions and multimodal exercise (aerobic exercise, resistance exercise and flexibility exercise) interventions have been shown to improve symptoms of fatigue in cancer patients undergoing treatment. The effect of resistance training on CRF in cancer patients during treatment is not well understood. Aerobic exercise and multimodal exercise appear to combat CRF by improving one or more of the following health-related fitness parameters; aerobic capacity, muscular strength and endurance, flexibility, and body composition. A standardized process of recording the intensity and volume of aerobic, resistance and flexibility exercise should be developed. Future studies should investigate in greater detail the role of resistance training in reducing CRF among cancer patients. Cancer is a group of diseases characterized by the uncontrolled proliferation of aberrant cells. Radiation therapy is one of the cancer treatments options. It uses high-energy waves to attack tumor cells, as well as adjacent cells. The majority of cancer patients report feeling tired at the start of treatment or after a few weeks of radiation therapy. It is one of the most disabling and ongoing side effects of anticancer therapy among cancer patients. As a result, cancer-related fatigue can be a troubling symptom for most people getting anticancer treatment which is commonly underdiagnosed by the health care team. This research study aids us in assessing fatigue in

cancer patients who receive radiation therapy as a treatment.

Keywords: *Cancer-related fatigue, cancer patients, resistance training, Radiation therapy,*

INTRODUCTION

Fatigue is one of the most common and quality-of-life debilitating symptoms in patients with cancer, though it still seems to be underreported, underdiagnosed, and undertreated during radiotherapy for cancer. Thus, cancer care practitioners in integrative oncology should have access to knowledge needed to identify patients at risk of experiencing fatigue during radiotherapy and understand the relation between fatigue and health-related quality of life as well as functional performance. Cancer-related fatigue refers to “a pervasive, subjective sense of tiredness persisting over time, interferes with activities of daily living, and is not relieved by adequate rest or sleep. Around half of patients with cancer receive radiotherapy as part of their cancer therapy. Up to 90% of them have been found to report fatigue. Fatigue typically decreases after radiotherapy, but may be long lasting and remain several years after completed radiotherapy. Previous studies have demonstrated that different physiological factors—such as type of cancer stage of disease concomitant chemotherapy and

situational factors such as higher educational level, and living alone were related to fatigue during radiotherapy. However, there are inconsistent findings regarding some factors' relationship with fatigue. For example, neither age nor gender predicted fatigue during radiotherapy for cancer, while younger age was associated with worse fatigue in other studies. Even if cancer type, stage of disease and treatment may give rise to fatigue, other factors may be of greater importance to the experience. The psychological influencing factor depressed mood may plausibly influence symptom experience, an effect observed by others regarding cancer-related fatigue. In addition, several other symptoms commonly co-occur with fatigue during a variety of cancer therapies, radiotherapy included. The concurrence of symptoms is thought to result in a multiplicative experience.

One of the most prevalent and incapacitating side effects of radiation treatment for cancer is cancer-related fatigue (CRF). Persistently high levels of fatigue that may not improve with sleep and might considerably hinder daily activities are symptoms of chronic fatigue syndrome (CFS). Discovering efficient non-pharmacological therapies to control CRF is of utmost importance in areas, where the cancer incidence is quite high. One non-invasive option for treating CRF is to do breathing exercises, which concentrate on guided, intentional breathing. Diaphragmatic breathing, mindfulness-based breathing, and timed breathing are some of the breathing techniques used in these workouts. These methods may aid in stress reduction, oxygenation, and

performance. Breathing exercises have promising theoretical underpinnings, but little is known about their practical effectiveness in lowering central nervous system fatigue (CRF) after radiation treatment for cancer patients. When I was fighting cancer, radiation, chemotherapy, and surgery were my only options for medical treatment. Thanks to targeted therapeutic methods, cancer patients now have far more control over their treatment. There is some indication that patients may have better results when they combine personalized therapy with more "traditional" chemo-therapeutics like taxanes and platinum compounds. The struggle against mortality and reduction in life duration for metastatic cancer will continue via research into innovative treatment options, including as hypnotherapy, biological molecules, and medications, until the anticipated therapeutic threshold is achieved.

LITERATURE REVIEW

Jayesha Hareesh Lilani (2024) Cancer related fatigue often begins before the cancer is diagnosed, worsens during the course of treatment and may persist for months – even years- after the treatment ends. Currently, studies are more focussed towards managing these physical symptoms using physical therapy, complimentary therapies and alternative therapies such as yoga, mindfulness meditation, and physical therapy including progressive muscle relaxation technique to reduce their adverse symptoms and enhance their quality of life. As this technique is simple to learn, has no negative impact and is feasible to perform anywhere so it is used on a large scale. Hence the aim of the review is to find out the effects of

progressive muscle relaxation technique on cancer related fatigue symptoms in patients receiving chemotherapy and radiotherapy.

Huan Xiang (2023) There is increasing interest in understanding exercise as a potential treatment for cancer-related fatigue (CRF); however, rarely research has been conducted on more aggressive cancers with short survival, such as liver cancer. The purpose of this study was to provide educational ideas for insufficient exercise and provide clues for the design of effective and safe exercise intervention programs with high compliance in patients of advanced liver cancer in the future. Participants were recruited from a tertiary cancer hospital using convenience sampling. All participants were asked to complete self-report questionnaires that assessed their medical and demographic variables, exercise habits and CRF during their hospitalization in the interventional department. Spearman's correlation analysis and Non-parametric test was used to explore correlations between exercise subgroups and CRF. Participants in the study showed serious fatigue and insufficient exercise. Exercise education can be initiated earlier, particularly those without regular exercise experience. Sustained light exercise, compliant with exercise habits and interests, three times a week may be a practical way to reduce the risk of CRF in advanced liver cancer.

Aflah Tasya Salim (2022) abnormalities in genes that typically regulate the growth and spread of aberrant cells are defining hallmarks of hereditary malignancies. The weariness that many cancer patients and survivors experience is common. Excessive tiredness might be an indication of cancer or a side effect of cancer therapy that

develops over time. Cancer survivors and patients may find information on many different types of physical activity that have the potential to alleviate cancer-related fatigue (CRF) on this page. Researchers reviewed the literature and decided on a descriptive qualitative approach. Relaxation techniques, yoga, the Walking Activity Program, and aerobic exercise help alleviate cancer-related fatigue (CRF) for certain patients.

Enyan Yu (2021) Those whose brains have undergone structural or functional alterations as a result of cancer treatment or a non-central nervous system malignant tumour are at a higher risk of developing cancer-related cognitive impairment (CRCI), according to research by Signs of CRCI often manifest as challenges with comprehension, memorization of words, focus, and multitasking. Cancer survivors often experience a decline in their quality of life due to CRCI. Radiation treatment, targeted medicines, surgery, hormone therapy, chemotherapy, and radiation all show promise in lowering the risk of CRCI. Multiple factors, including genetics, the environment, psychology, and social dynamics, contribute to the complicated aetiology of CRCI. Possible therapies include modifiable, continent, fluoxetine, fluoxetine, donepezil, ZnSO₄, n-acetyl cysteine, propofol, and dementia medication.

Multimodal exercise intervention

It is apparent that a gap in the literature exists concerning the effects of resistance training to combat CRF in cancer patients undergoing treatment. However, there are a multitude of studies that examine the effects of a multimodal exercise intervention in combatting CRF in cancer

patients. Interventions made up of resistance exercise, aerobic exercise, and flexibility (stretching) exercise has consistently been shown to improve symptoms of fatigue in cancer patients. Resistance training was carried out at low to moderate intensity using resistance bands with the aim of maintaining strength during treatment. Patients in the exercise group did exhibit better aerobic capacity and muscle strength than those in the control group; however, the changes were not significant. Importantly, not only did patients in the exercise group reveal an improvement in CRF after the four-week program but they exhibited further improvement in CRF at a three-month follow-up assessment. Conversely, the control group symptoms of CRF worsened from baseline to three-month follow-up.

Combined approach to cancer-related fatigue

Patients may benefit from a multimodality approach that utilizes individualized treatment plans, the most prominent example of which is the Cancer-Related Fatigue. The clinic was established in 1998 with the purpose of improving patients' quality of life by decreasing fatigue. The purpose was to integrate the objective evaluation of fatigue with the development of an innovative treatment plan that included pharmacologic and non-pharmacologic therapies as well as education of patients, families, and health care providers. Patients also received a fatigue assessment package containing several fatigue assessment measures. On initial consult, practitioners devised an individualized treatment plan. Treatment modalities could include the treatment of reversible associated symptoms or

comorbidities; education and counselling, including the provision of take-home literature; and other standard pharmacologic and non-pharmacologic therapies.

Relationship between fatigue and cancer

Patient's quality of life is significantly impacted by Cancer Related Fatigue, which is widespread. Thus, it's critical to comprehend the pathophysiology of Cancer Related Fatigue in order to develop useful strategies for prevention and treatment.⁷ Promising new theories have been put up concerning the pathophysiology of cancer related fatigue, including the ones about pro inflammatory response, serotonin, anaemia, vagal- afferent activation and adenosine triphosphate.⁸ Similar to characteristics commonly referred to as "sickness behaviour", cancer related fatigue frequently co-occurs with symptoms such as pain, sleeplessness, lethargy, disturbed mood and cognitive impairment. Cancer related fatigue, and sickness behaviour is an adaptive response to inflammation. Through the central nervous system's cytokine signalling, cancer and its treatment can trigger the peripheral pro inflammatory cytokine network and causes cancer related fatigue symptoms.

Breathing Exercise interventions

Relaxation breathing can help reduce stress and anxiety. When feeling stressed, taking shallow breaths may help. It is important to use full lung capacity and breathe slowly and deeply. There are numerous relaxation breathing methods that can be effective. For example, one can inhale through the nose for five seconds and fill the torso up with air, hold the breath for two seconds, and then exhale from the mouth for five seconds, pressing the navel in towards the spine. The

lung cancer patient should learn diaphragmatic breathing through pursed lips. Diaphragmatic breathing strengthens the diaphragm and the abdominal muscles. This will allow more air to move in and out of the lungs with less tiring of the chest muscles. When the diaphragm becomes weak, the patient compensates by using the shoulders and other muscles to help them breathe. Breathing with pursed lips is beneficial and can be used with the diaphragmatic breathing. The hand is placed on the abdomen. The patient, sitting or standing up straight, should inhale through the nose while gently pushing the abdomen out.

METHODOLOGY

The longitudinal component of the design will involve repeated measurements over an extended period of time, typically before, during, and after the intervention. This allows for the tracking of changes in CRF levels and other outcomes over time, thus providing insights into both the immediate and sustained effects of the intervention. By conducting assessments at multiple time points, the study will be able to examine whether the benefits of the breathing exercises are temporary or enduring. Additionally, the longitudinal design will help account for potential confounding variables that could affect CRF, such as changes in treatment plans or patient adherence to prescribed therapies. Furthermore, longitudinal tracking will allow for the exploration of the trajectory of CRF over time in both the intervention and control groups, which can help identify the critical windows for intervention and recovery. For instance, it will reveal whether improvements in CRF occur early in the intervention or require a longer

period for noticeable effects to manifest. This will provide a more comprehensive understanding of how breathing exercises influence CRF on a longer-term basis, which is crucial for designing effective and sustainable interventions in cancer care settings. Overall, the experimental and longitudinal design of this study will provide strong evidence regarding the role of non-pharmacological interventions like breathing exercises in managing CRF among cancer patients undergoing radiation therapy. By comparing two distinct groups over time, this approach allows for a thorough evaluation of the intervention's effectiveness and the factors that may contribute to its success or limitations.

RESULTS & DISCUSSIONS

Fatigue is a multidimensional concept that generally involves the feeling of tiredness and weakness which cannot be expressed clearly. It has been observed that 90% of the patients undergoing radiation therapy experience cancer related fatigue. It is observed that it can induce early fatigue in about 80% of the patients. Here in the study, the majority of patients were experiencing fatigue receiving radiation therapy Table 1 and Fig. 1 Show that the majority of the patients were experiencing substantial fatigue, that is, 105 (76.08%) of patients were experiencing fatigue, 8 (5.79%) were experiencing extreme fatigue, and only 25 (18.11%) were experiencing no fatigue.

Table: 1 Frequency and percentage distribution of fatigue among cancer patients receiving radiation therapy

Sl. no.	Level	Scoring	f	%
				<i>n</i> = 138

1	No fatigue	10–21	25	18.11
2	Substantial fatigue (22–50)			
	Fatigue	22–34	105	76.09
	Extreme fatigue	35–50	8	5.80

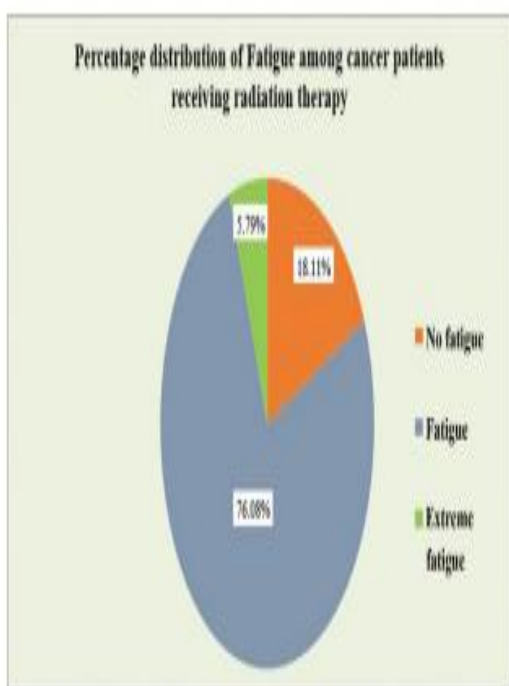


Fig. 1 It shows the frequency and percentage distribution of fatigue among cancer patients receiving radiation therapy

Assessing fatigue among cancer patients receiving radiation therapy would help the health care professionals to consider the impact of fatigue on the individual and effective fatigue management to improve the wellbeing of patients. Some important points of the study are mentioned below.

Table 2 Area wise analysis of fatigue among cancer patients receiving

radiation therapy using mean, standard deviation and mean percentage

Sl. no.	Area wise analysis	Mean	Standard deviation	Maximum	Minimum	Mean %
1	Physical fatigue	13.68	3.44	24.00	5.00	57
2	Mental fatigue	10.05	3.29	20.00	4.00	50.25

Table 2 deals with the area wise distribution of fatigue among cancer patients receiving radiation therapy. Mean percentage shows that the majority 57% of the patients with cancer experience physical fatigue and 50.25% with mental fatigue

CONCLUSION

Exercise has been shown to minimize the severity of CRF, halt the onset of CRF and improve symptoms of CRF in cancer patients undergoing treatment. This review focused on the specific effects of aerobic exercise, resistance exercise and a multimodal intervention (aerobic, resistance with/without flexibility) on CRF. Aerobic exercise and multimodal interventions have proved they can significantly reduce or improve the symptoms of CRF in cancer patients undergoing treatment. A significant similarity in the process by which both

modes of exercise combat CRF is that it improves one or more health-related fitness parameters. For optimal results, do breathing exercises three or four times a day, ideally first thing in the morning, mid-afternoon and just before you turn in for the night. Cancer patients coping with radiation therapy side effects may find breathing exercises useful because they help patients relax, increase oxygenation, and enhance overall health. Patients receiving radiation treatment may find the following breathing exercises beneficial. Breathing exercises may be a helpful coping mechanism for some persons going through radiation treatment, both emotionally and physically. Making these changes a regular part of a cancer patient's routine may help them feel better physically and mentally. Seeing a doctor before beginning an exercise program is crucial for everyone, but particularly those undergoing cancer treatment.

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