***Review Article***

**Mindfulness-based therapies and Cancer-related fatigue: A Narrative Review**

**Abstract**

Globally, the prevalence of cancer is steadily increasing, making it the second most common cause of death from non-communicable diseases, after cardiovascular disorders. It represents the highest rates of morbidity and mortality, and its prevalence continues to rise. Despite significant advancements in treatments, most cancer therapies are associated with both immediate and long-term side effects, including nausea, fatigue, appetite loss, hair loss, pain, and others. One of the most common and debilitating symptoms is Cancer-Related Fatigue (CRF). According to the European Association of Palliative Care, fatigue is "a subjective feeling of tiredness, weakness, or lack of energy." CRF can develop at any stage of the illness and may persist for years after treatment. The primary objective of this review is to explore the impact of mindfulness-based therapies in managing CRF. Integrative oncology, combining conventional therapies with evidence-based Complementary and Alternative Medicine (CAM) practices, offers a holistic, patient-centered approach to CRF management. This includes mindfulness-based and biobehavioural therapies, such as yoga and meditation. This review aims to examine the research on the successful application of mindfulness techniques to effectively address CRF, offering insights for improving patient care and quality of life.

**Keywords**- *Cancer-related fatigue, Mindfulness, Yoga*

# Introduction

Cancer is the second most common cause of non-communicable disease-related mortality following cardiovascular disease (Shaji et al., 2023). Being one of the most feared chronic diseases, it also accounts for the highest rate of morbidity. Worldwide, several millions of individuals are diagnosed with cancer, and its incidence is still on the rise. A cancer diagnosis is a major life stressor that can negatively impact a person's physical, social, spiritual, and psychological well-being. Despite interesting advancements in the available treatment modalities, most of the cancer treatment regimens are associated with immediate and late side effects. Nausea, vomiting, fatigue, loss of appetite, changes in taste, dry mouth, hair loss, altered bowel habits, and pain are a few of them (Altun & Sonkaya, 2018)

Fatigue is very prevalent and is one of the most distressing symptoms that have a detrimental impact on the overall quality of life during all stages and facets of the cancer journey (Al Maqbali et al., 2021). It is described as "a subjective feeling of tiredness, weakness, or lack of energy," according to the European Association of Palliative Care (EAPC) (Radbruch et al., 2008). One of the most debilitating symptoms cancer patients succumb to is fatigue.

Cancer-related fatigue (CRF) can be described as complex, multifaceted, and distressing exhaustion caused by cancer and/or its treatments that interfere with daily activities (Yang et al., 2019). CRF can be distinguished from the "normal" drowsiness felt by healthy people in that it is not alleviated by rest or sleep and is characterized by feelings of exhaustion, weakness, and loss of energy (Hofman et al., 2007). It is described as intense and chronic tiredness on a physical, emotional, and cognitive level, which is not related to previous activities and cannot be entirely reduced by sleep (Bower, 2014).

90% of cancer patients report CRF during their active treatment and more than 50% of them report fatigue after the completion of the treatment. It may set in both as a consequence of cancer as well as a side effect of cancer treatment. CRF is not just a symptom of advanced cancer, it can arise at any stage of the disease and can last for years after the completion of the treatment regimen (Kirshbaum, 2010).

As CRF directly impairs and hinders the overall quality of life in cancer survivors, effective management of CRF is vital to address the multifaceted impact of this symptom on cancer patient's physical, emotional, and social well-being. And it is crucial to assist patients in coping with this difficult aspect of cancer and its treatment. For the best management of CRF, a multimodal approach that involves both pharmaceutical and non-pharmacological interventions is frequently advocated.Top of Form

A meta-analysis conducted by Mustian et al included the four most commonly recommended treatments for CRF including exercise, psychological intervention, exercise and psychological intervention combined, and pharmacological intervention, and concluded that pharmacological interventions did not improve CRF to the same extent as nonpharmacological interventions (Mustian et al., 2017). It is crucial to intervene and to provide the best comprehensive management strategy with the combination of CAM system and with patient-centred, individually tailored holistic approach.

MBIs are evidence-based intervention for treating symptoms of cancer and its treatments, which cannot be effectively treated with the pharmacological interventions. Being Mindful- is to be aware of one’s thoughts, feelings, body sensations, and surroundings in the present moment (Baer et al., 2019). With a salutogenic, health-promoting focus that encourages and promotes mindfulness, which subsequently helps one to become aware of his current moment, it also complements conventional medicine. Additionally, it aids in actively setting aside anxieties from one's thoughts, which lessens stress and promotes relaxation and simultaneous mental and physical recovery. MBIs teach participants to pay attention to present-moment experiences in a compassionate and nonjudgmental manner (Shapero et al., 2018).

Mindfulness focuses on accepting the current moment without judgement. Cancer patients can utilise mindfulness to manage with their challenges, cultivating acceptance and lowering the mental and emotional energy used on opposing or struggling with their situation. MBI has definitive effect on anxiety, depression, pain, loneliness, and sleep disturbance, and that in turn will help to relieve fatigue related to cancer such as emotional distress, sleep disorder, activity level, malnutrition, pain, anaemia and non-cancer commodities (Figure 2).

A study conducted by Ikeuchi K et al., concluded that - mindfulness, has a direct effect on fatigue, and also indirectly mitigates anxiety, depression, pain, sense of isolation, and sleep dysfunction and hence will alleviate the symptom of fatigue among cancer patients (Ikeuchi et al., 2020).

# Aim and Objective of the current review

This review is aimed at mapping the available literature and to provide thorough thought on the significance of Mindfulness-Based Interventions (MBIs) on cancer-related fatigue (CRF).

# Methods

# Literature Research

This review consists of a literature search at NCBI PubMed, Cochrane, and EMBASE using keywords like mindfulness-based interventions, mind-body intervention, cancer, and oncology. For a broader range of searches, there was inclusion of terms like Yoga, meditation, mindfulness-based stress reduction, and mindfulness meditation. Full-text copies of all studies of possible relevance were obtained. A manual search of reference lists of all approved papers was conducted for additional information, ensuring the inclusion of relevant articles identified through cross-references

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Figure 1: Flow Chart of identification and screening of studies via Database search

# Selection of the studies

To include in this review, articles signifying the efficacy of mindfulness-based interventions in the management of cancer-related fatigue, published from 2018 to 2022, Randomized controlled trials, Systematic reviews and meta-analyses, and observational studies including only human subjects, published in the English language were considered (Figure 1).

Screening was performed for titles and abstracts by two independent review authors, potentially eligible citations were retrieved for full-text review. A third review author checked the excluded records.

Abstracts, editorials, conference proceedings, clinical trial registrations, and grey literature were excluded (Table 1).

**Table 1** Mindfulness-based interventions given to cancer patients, published in 2018–2022

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| **S.**  **No.** | **Author** | **Study Design** | **Sample size** | **Methodology** | **Result** | **Conclusion** |
| 1 | (Haller et al., 2021) | An Observational Study | n = 57 | In addition to standard care, female breast cancer patients received 66 hours of personalized mind- body-medicine group therapy. Mindfulness training, yoga, moderate exercise, diet, complementary  self-help tactics, cognitive restructuring, and acupuncture were the part of the program. | Global EORT quality of life was improved among the patients.  Stress, anxiety and depression were also found to be significantly reduced.  Noticeable changes were also observed in the fatigue levels experienced by the patients. | Breast cancer patients benefit from an  integrative mind-body  medicine group program during chemotherapy in terms of quality of life and psychological symptoms. |
| 2 | (Zhang et al., 2019) | A systematic review and meta-analysis | NA (N= 1082) | A systematic search in many electronic databases were done using appropriate keywords to arrive at the trials  examining the  effects of  Mindfulness-Based Stress Reduction (MBSR) on breast  cancer patients. | 7 studies reported that MBSR had a positive effect on fatigue among patients with breast cancer. | MBSR can be offered to breast cancer patients as a  supplemental or adjunctive therapy. |
| 3 | (Johns et al., 2021) | A systematic review and meta-analysis of randomized controlled trials | N =  2239 | A thorough search in multiple electronic databases was conducted using appropriate keywords to find randomized controlled studies assessing the  efficacy of Mindfulness-Based Interventions (MBIs) in  improving fatigue related outcomes in adult cancer  survivors. | MBIs  significantly reduced fatigue compared to controls at the post- intervention. | MBIs show  promise in improving fatigue and vitality/vigor in cancer survivors. |
| 4 | (McCloy et al., 2022) | A systematic review and meta-analysis of randomised control trials | N =  2326 | Five electronic databases and two trial registrations were searched for randomised  control trials that investigated the effects of  mindfulness on cancer-related fatigue (CRF)  and psychological well-being in female cancer patients. | Mindfulness significantly improved CRF,  depression and anxiety among female patients with cancer. | Mindfulness appears to be useful in  lowering CRF in female cancer survivors. |
| 5 | (Ng et al., 2021) | Randomized controlled trial | n = 80 | The study recruited patients with hematological malignancies who had a fatigue. The intervention group received standard care plus a 30- minute guided mindful breathing session, while the control group received standard care. | The interventional group exhibited lower fatigue scores on both the Edmonton Symptom Assessment System (ESAS) and the Functional Assessment of Chronic Illness Therapy (FACIT)  Fatigue Scales at the 30th minute. | A single 30- minute session of mindful breathing is  beneficial in lowering fatigue in haematological cancer patients and can be  regarded a valuable addition to existing treatments. |
| 6 | (Liu et al., 2021) | Randomized controlled trial | n = 120 | Patients with Differentiated Thyroid Cancer were randomly assigned to the Mindfulness- Based Stress Reduction (MBSR)  intervention group or the usual care group. The MBSR group received an 8- week MBSR programme that began 8 weeks before radioactive iodine therapy  (RIT). | Patients in the MBSR group improved significantly more in terms of emotional function, fatigue, general quality of life , depression, and anxiety. | An 8-week MBSR program can significantly improve a wide range of scales in health-related QoL and can mitigate depression and anxiety among differentiated thyroid cancer (DTC) receiving RIT. |
| 7 | (Sheikhzadeh et al., 2021) | Randomized controlled trial | n = 60 | Patients diagnosed with cancer were randomly allocated to 3 groups, namely Mindfulness-Based Cognitive Therapy (MBCT), Cognitive Behavioral Therapy (CBT) and wait-list group (WLG). 8 weeks of  intervention was given. | There was a significant reduction in depression, anxiety, and fatigue levels in the CBT and MBCT  groups. | CBT and MBCT could be  considered a good addition to pharmacological treatment for cancer patients with concomitant psychosocial symptoms. |
| 8 | (Gok Metin et al., 2019) | An assessor blinded, three- arm, randomized controlled trial | n = 92 | Participants from three groups were randomly assigned to Progressive Muscle Relaxation (PMR), Mindful Meditation (MM) and control groups. The interventions were given for 12 weeks and control group received a single time attention-matched education for 15- min on breast cancer before the start of their chemotherapy regimen. | At weeks 12  And 14, the PMR and MM groups had significantly lower Brief Fatigue Inventory (BFI) scores as compared to the Control Group. | PMR and MM are effective therapies that, when combined with chemotherapy, will be  beneficial for reducing fatigue among patients with breast cancer. |

# Results

A total of 115 articles were identified through the electronic database search. Title and abstract screening were performed for all the relevant articles. After the application of inclusion and exclusion criteria, 8 studies were found appropriate for this review. In examining the diverse body of literature related to the efficacy of mindfulness-based interventions on cancer related fatigue, several prominent findings were noted, reflecting both the depth and breadth of research in this field. Numerous studies have been taken up by enthusiastic researchers to explore the benefits of mindfulness-based interventions among cancer patients. The synthesis of evidence revealed a compelling linkage between MBIs and CRF, shedding light on the intricate interplay between these essential components in cancer care. This integrative approach highlights the complexity of the subject matter and lays the groundwork for a more nuanced understanding. As we delve deeper into the literature, a notable pattern emerged regarding the benefits of MBIs in the management of CRF.

# Discussions

According to the literature, fatigue can be caused by the interaction of several psycho-physiological processes. Further, evidence (Liu X et al.,) suggests that cancer and its treatments activate the immune system by triggering the production of pro-inflammatory cytokines, resulting in peripheral inflammation; these events subsequently alter the glucocorticoid hormone response and cause mitochondrial dysfunction. A study on mindfulness interventions in cancer patients show that mindfulness can boost the function of anti-inflammatory glucocorticoid receptors in leucocytes (Carlson et al., 2019).

According to the previously published evidence (Kim et al., 2021), the practice of mindfulness can guide participants purposefully pay attention to the present moment and non-judgmentally monitor the unfolding of experiences moment by moment, and therefore having a profound benefit via the mind-body connection. It guides individuals to focus on their bodily sensations and acknowledge any discomfort without interpretation, elaboration, or evaluation. This enables people to recognise, accept, and disengage from unpleasant bodily sensations and dysfunctional thinking processes. By this, an individual will also learn strategies to combat reactive avoidance behaviour and ruminative thought patterns that are akin to the development and relapse of anxiety and depression and thereby helps to lessen the overall symptom burden of fatigue.

Johns et al. (Johns et al., 2021) conducted a pilot study to examine the efficacy of mindfulness-based stress reduction (MBSR) for CRF and related symptoms in a sample of 35 cancer survivors. They were allocated to either a 7-week MBSR intervention or a wait-list control group. The study found that mindfulness-based stress reduction is a promising treatment for CRF and associated symptoms.

A study conducted by (Zetzl et al., 2021) also found that weekly reminder e-mails can positively influence cancer patients to establish a regular Yoga practice at home and they will have improvement in their general and emotional fatigue. This can also be used as a strategy for the continued practice of MBIs to get the desired physiological benefits.

Two prominent meta-analyses have provided strong evidence supporting the efficacy of Mindfulness-Based Stress Reduction (MBSR) in managing CRF. A meta-analysis by Xie et al., showed that MBSR was a successful intervention in reducing the severity of CRF, with notable improvements in patients' levels of fatigue and general well-being (Xie C, Dong B, Wang L, et al., 2020). The comprehensive benefits of mindfulness for cancer patients were also demonstrated by He et al., who conducted a systematic review and meta-analysis and discovered that MBSR interventions not only significantly reduced CRF but also improved psychological distress (He J, Hou JH, Qi J, et al., 2020). These findings reinforce the value of integrating mindfulness practices, into holistic treatment plans for individuals experiencing CRF, offering a promising non-pharmacological approach to support cancer patients' quality of life.

Even when the world was hit by COVID-19, Internet-Based Mindfulness-Based Stress Reduction (iMBSR) program was found beneficial for patients with Breast Cancer. A study conducted by Chuanyuan Kang and his co-workers concluded that, an 8 weeks of iMBSR was efficacious in reducing the psychological symptoms and in improving quality of life (Kang et al., 2021).

It is also been found that MBIs given to family care givers of cancer patients has the potential to enhance the overall wellbeing and can reduce the burden on family care givers. And this in turn can help those family care givers to take more care of the cancer patient (Al Daken & Ahmad, 2018).

In a qualitative study, Fernanda F. Zimmermann et al. concluded that, mindfulness-based intervention like Coping with Cancer Mindfully can provide psychological and emotional support to the patients with advanced cancer (Zimmermann et al., 2020).

A Single-Blinded Randomized Controlled Trial conducted by Yildirim and his co-workers concluded that a 10-day mindfulness-based stress reduction programme combined with music therapy had considerably reduced stress and depression levels and also improved overall psychological well-being scores (Yildirim et al., 2024).

Certainly, based on the available evidence and research findings, it can be concluded that MBIs show promise in effectively reducing CRF. Numerous studies, have suggested that incorporating mindfulness practices, such as meditation and mindful awareness, into the treatment plans of cancer patients can lead to significant improvements in fatigue levels (Xie C et al., & Johns SA et al.,). These interventions not only address the physical aspects of fatigue but also contribute to enhancing overall well-being and quality of life for individuals undergoing cancer treatment.

Despite the richness of relevant insights, it is necessary to recognize the limitations of the studies addressed. It is crucial to recognize the heterogeneity of study designs, mindfulness interventions, and cancer populations found in the reviewed literature. Through a careful examination of the evidence presented in the reviewed articles, it becomes evident that there is a need for continued exploration and refinement of certain concepts, methodologies, and gaps in the existing literature. In future studies, standardization and rigorous methodology will boost the validity of findings and make it easier to identify specific characteristics that contribute to the success of mindfulness-based therapies. Additionally, the majority of studies predominantly focused only on mindfulness-based stress reduction, raising questions about the broader applicability of the observed patterns.

The insights gained from this review contributes to the existing body of literature, provides a foundation for scholars, and practitioners to consider MBIs as a part of CRF management protocols. As the landscape of the topic evolves, this narrative review serves as a valuable resource for those seeking to navigate the effectiveness of MBIs in CRF management.

Although further research is needed to fully understand the mechanisms and long-term effects, the existing body of evidence supports the potential benefits of MBIs in alleviating CRF. Integrating these practices into comprehensive cancer care approaches may offer a valuable and holistic means of improving the overall health and resilience of cancer patients. Further many protocols must be conducted with RCTs and other standards to validate the beneficial influences of mindfulness-based interventions on cancer related fatigue.

A more refined understanding of beneficial effects of MBIs, could inform more effective strategies for the management of CRF. The theoretical contributions of this review can encourage scholars to explore novel pathway in future research.

**Conclusion**

The evidence presented in this narrative review suggests that mindfulness-based interventions (MBIs) offer potential as a supportive approach for managing CRF. However, it is crucial to highlight that while MBIs show promise, they should be considered as part of a comprehensive, integrative approach that combines both conventional cancer treatments and complementary practices. The current body of evidence supports the inclusion of MBIs alongside conventional therapies, but more research, particularly with RCTs, is needed to validate their long-term effects and refine methodologies. Future studies should aim to standardize approaches and explore the broader applicability of MBIs in various cancer populations. The integration of MBIs into conventional treatment protocols could provide a more holistic and patient-centered care model, improving the overall health, resilience, and quality of life of cancer patients. As the field continues to evolve, ongoing investigation will be critical to understanding the full potential of MBIs in CRF management.

**Disclaimer (Artificial intelligence)**

Authors hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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