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REVIEW ARTICLE

The Efficacy and Benefits of Yoga in Hematological Malignancies: A Systematic Review of Randomized Controlled Trials

S. Giridharan, Rajanee Bhana

[1]Consultant Oncologist, Department of Oncology, Tawam Hospitals, Al Ain, UAE.
[2]Consultant Oncologist, Department of Oncology, University Hospitals of North Midlands, Stoke on Trent, UK.

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ABSTRACT

Introduction: Hematological malignancies, such as leukemia, lymphoma, and multiple myeloma, contribute significantly to global cancer morbidity and mortality. Patients often face high chemotherapy toxicity and significant physical and psychological symptoms. The use of yoga as a supportive care intervention has shown promise in alleviating these side effects and enhancing patients' quality of life (QOL).

Methods: Following Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, a comprehensive literature search was conducted in PubMed, Scopus, Web of Science, and the Cochrane Library using specific keywords related to yoga and hematological malignancies. Studies from 2000 to 2023 that investigated the effects of yoga on physical or mental health outcomes in patients with hematological malignancies were included. Data extraction and synthesis were performed by two reviewers, focusing on study design, sample size, intervention details, outcome measures, and critical findings. The quality of studies was assessed using the Cochrane Risk of Bias tool.

Results: The search yielded 903 items, with five randomized controlled trials meeting the inclusion criteria. These trials demonstrated that yoga intervention significantly reduced fatigue, emotional distress, and pain in patients with hematological malignancies. However, challenges related to the feasibility of online interventions and adherence were noted.

Conclusion: Yoga interventions have the potential to significantly enhance the QOL for patients with hematological malignancies by mitigating fatigue, pain, and psychological distress. Further research is warranted to optimize these interventions and integrate yoga into comprehensive cancer care.

1. INTRODUCTION

Hematological malignancies, comprising a range of cancers including leukemia, lymphoma, and multiple myeloma, account for a substantial portion of global cancer diagnoses and fatalities. The incidence and prevalence of these malignancies have exhibited an upward trend over the years, posing significant public health concerns. They represent approximately 7% of all cancers and rank as the fourth most frequently diagnosed cancer in the western world.[1,2]

Patients suffering from hematological malignancies are confronted with a double burden, as they are subjected to high levels of chemotherapy toxicity, which reaches as high as 83% in instances of lymphoma or leukemia and 82% in cases of multiple myeloma.[3] In addition, these individuals frequently grapple with a range of physiological and psychological symptoms, such as exhaustion, discomfort, emotional anguish, and reduced capacity to carry out daily activities.[4]

In recent years, supportive care interventions have gained attention for their capacity to improve cancer treatments' side effects and enhance patients' overall quality of life (QoL). There is a growing trend among cancer survivors to explore complementary and alternative medicine (CAM) as a means of alleviating symptoms, improving QoL, and managing stress.[5-7] CAM encompasses various interventions, including yoga, which aim to address the comprehensive well-being of individuals, extending beyond conventional cancer treatment.[8] The widespread adoption of CAM among cancer survivors highlights the need for an integrated care approach that complements traditional medical treatments.[9,10]

Corresponding author:
Dr. Selvaraj Giridharan, Department of Oncology, Tawam Hospitals, UAE.
E-mail: selvagiri@icloud.com

Yoga, an ancient practice originating from India, has emerged as a prominent complementary therapy in cancer care due to its capacity to enhance health outcomes and alleviate treatment-related symptoms. Yoga is a discipline comprising techniques such as asanas (postures), pranayama (breathing exercises), meditation, and ethical principles.[11] By promoting a harmonious balance between the body, mind, and spirit, yoga enhances both physiological and psychological well-being.[12, 13] The extensive benefits of yoga have been established across a range of health conditions, including chronic pain and heart, lung, and neurological diseases, making it particularly relevant for cancer patients navigating the intricacies of their treatment.[14,15]

Recent studies have explored the potential of yoga as a complementary therapy in cancer care, demonstrating its feasibility and benefits in enhancing physical functioning, reducing fatigue, and promoting better sleep quality and psychological well-being.[16-18] Over the past few decades, significant advancements have been made in the treatment of hematological malignancies, resulting in an increasing number of cancer survivors and individuals living with these conditions.[19]

Living with hematological malignancies is often accompanied by a considerable symptom burden resulting from treatment-related side effects and late effects.[20,21] To address this issue, non-pharmacological interventions have been developed and investigated to provide comprehensive supportive care to patients. It is essential to note that relying solely on pharmacology may not always be sufficient to address the early and late effects of the disease and treatment.[22] In this context, any treatment not classified as a registered drug, such as physical activity and psychosocial or psychological interventions, is considered non-pharmacological.[23]

Yoga has been integrated as a complementary therapy with conventional treatments in cancer care, demonstrating beneficial effects on cancer-related symptoms, such as fatigue, stress, sleep disturbances, and overall QOL. Yoga offers a holistic approach that addresses cancer patients' physical, emotional, and spiritual well-being.[14] A number of studies have explored the feasibility and benefits of yoga interventions for cancer patients, indicating that yoga is well-tolerated and can improve various outcomes, including physical functioning, fatigue, sleep quality, and psychological well-being.[24-27] However, it is important to note that the duration, schedule, and frequency of yoga interventions may vary across studies.

Previous research has shown that yoga can effectively reduce cancer-related fatigue, stress, anxiety, and depression while improving sleep and overall QOL in cancer patients.[28-30] These benefits are linked to yoga's ability to regulate the autonomic nervous system, decrease inflammatory markers, and enhance physical strength and flexibility. However, most of the research has focused on patients with solid tumors, with only a few studies specifically addressing individuals with blood cancers.

This review aims to summarize the existing literature on the effects and benefits of yoga in patients with hematological malignancies. By examining how yoga affects physical and mental health, we aim to provide an overview of its potential benefits and practical considerations for integrating yoga into patient care and also endeavor to highlight areas where further research is needed to optimize support for this group of patients.

2. METHODS

We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines to ensure a comprehensive and transparent review process.[31] Our search involved using specific keywords and medical subject headings related to both yoga and hematological malignancies, such as "yoga," "hematological malignancies," "leukemia," "lymphoma," "multiple myeloma," "supportive care," and "QOL." We searched various electronic databases, including PubMed, Scopus, Web of Science, and the Cochrane Library, to identify studies on the effects of yoga on patients with hematological malignancies.

2.1. Inclusion and Exclusion Criteria

Studies were included in this review if they investigated the effects of yoga interventions on patients diagnosed with hematological malignancies and reported outcomes related to physical health (e.g., fatigue and immune function), mental health (e.g., anxiety and depression), or QOL. Eligible studies encompassed randomized controlled trials (RCTs), published in peer-reviewed journals in English from 2000 to 2023. Studies were excluded if they were non randomized, review articles, editorials, or opinion pieces without original data, or did not provide sufficient details on the yoga intervention or study outcomes.

2.2. Data Extraction, Synthesis, and Quality Assessment

Two reviewers independently extracted data to ensure accuracy and consistency. Key information extracted from each study included the study design (e.g., RCT and cohort study), sample size and patient demographics, type and duration of the yoga intervention, outcome measures, key findings, and any reported adverse events or safety considerations. The extracted data were synthesized qualitatively, focusing on the reported effects of yoga on physical and mental health outcomes and potential mechanisms of action. The quality of the included studies was assessed using standardized tools appropriate for each study design. For RCTs, the Cochrane Risk of Bias (RoB) tool was used to evaluate factors such as randomization, blinding, and completeness of outcome data.[32] Any discrepancies in the quality assessment were resolved through discussion between the reviewers. Due to the heterogeneity in study designs, interventions, and outcomes, a meta-analysis was not conducted. Instead, a narrative synthesis approach was used to summarize the findings. The results are presented descriptively, highlighting trends and patterns in the data and any notable differences between studies.

3. RESULTS

During the search process, 903 items were found across all databases. After removing 109 duplicate records, 794 items remained for initial screening. Out of these, 780 records were excluded based on titles and abstracts, resulting in 14 reports. Further screening excluded papers that did not primarily feature yoga as the intervention [Figure 1]. Ultimately, five RCTs were included in the review, all of which investigated the effects of yoga on patients with hematological malignancies.[33-36] The following table summarizes each study's design, population, outcomes, and key findings [Table 1].

In a randomized pilot study by Eckert *et al*., the feasibility and preliminary efficacy of a 12-week online Hatha yoga intervention were evaluated compared to an educational podcast control group among survivors of allogeneic bone marrow transplant (BMT).[32] The study involved 72 participants recruited nationally and assigned to either yoga or control groups. The yoga intervention involved 60 minutes of online Hatha yoga per week, while the control group listened to educational podcasts for the same duration. Feasibility benchmarks included participant satisfaction, adherence to the intervention,

and completion of online questionnaires at designated time points. Outcomes measured encompassed the Lee Symptom Score, physical function, fatigue, anxiety, sleep disturbance, social functioning, pain interference, depression, and QOL.

The study's results were promising. Over half of the yoga group completed the post-intervention questionnaire, with a significant majority expressing satisfaction with the intervention. Notably, 15.8% of the participants showed intent to continue practicing online yoga, indicating a potential long-term benefit. The average participation in the yoga group was 31.98 minutes per week, suggesting a feasible and sustainable practice. Both groups experienced significant improvements in the Lee Symptom Score and depressive symptoms.

In contrast, only the yoga group demonstrated a significant reduction in pain, further highlighting the potential of yoga in improving the QOL of BMT survivors. While the study revealed promising results, it also highlighted the need for further research. The feasibility benchmarks were not fully met due to low adherence and a high dropout rate, indicating the need for a more comprehensive understanding of the barriers to participation. While satisfaction with online yoga was evident among most participants, and there were beneficial effects on specific symptoms, the feasibility of delivering online yoga to this population was limited. Therefore, further research is necessary to investigate participation barriers and establish the efficacy of online yoga interventions for BMT survivors.

In a single-center, open-label, and RCTs, Chopra *et al*. studied the impact of Isha Kriya, a 12-min guided meditation, on the QOL of hematopoietic cell transplantation (HCT) recipients.[33] Seventy-two participants, including autologous and allogeneic HCT recipients, were randomly assigned in a 1:1 ratio to either the Isha Kriya intervention group or a control group with no intervention. The intervention group practiced the Isha Kriya meditation twice daily from before the transplantation to day +30 after the transplantation. QoL was measured using the Functional Assessment of Cancer Therapy-Bone Marrow Transplantation (FACT-BMT) and Patient-Reported Outcomes Measurement Information System Global Health (PROMIS-GH) questionnaires at baseline (pre-HCT), day +30, and day +100 post-HCT. Thirty-six recipients were in the Isha Kriya arm, and 36 were in the control arm. The groups were similar in age, sex, diagnosis, and type of HCT. At day +30 post-HCT, there were no significant differences in the mean total FACT-BMT scores or PROMIS-GH scores between the Isha Kriya and control groups. However, the Isha Kriya group showed a statistically and clinically significant improvement in the BMT-specific QoL subscale scores compared to the control group (mean BMT subscale score of 27.9 vs. 24.4, $P = 0.03$; Cohen's d = 0.5, indicating a medium effect size). This effect was temporary, as the differences in BMT subscale scores were not sustained at day +100 post-HCT. There were no significant differences in the physical, social, emotional, and functional domain scores between the groups at any time.

Joshi *et al*.'s study aimed to assess the impact of a combined pranayama and mindfulness meditation intervention on emotional distress and fatigue in adult hematological cancer patients undergoing chemotherapy.[34] A total of 27 patients were randomly assigned to either the intervention group ($n = 12$) or the control group ($n = 15$). The intervention group practiced slow-paced pranayama and mindfulness meditation for 15 min daily over 6 weeks, while the control group received standard care.

Emotional distress and fatigue were evaluated using the Emotion Thermometer (ET) and the Fatigue Assessment Scale (FAS) at baseline and after 6 weeks. Within the intervention group, there were statistically significant reductions in distress, anxiety, anger, depression, need for help scores on the ET, and total fatigue, physical fatigue, and mental fatigue scores on the FAS. In contrast, the control group did not significantly improve these parameters.

Between-group comparisons revealed significant reductions in distress, anxiety, anger, need for help, total fatigue, physical fatigue, and mental fatigue in the intervention group compared to the control group. These findings suggest that pranayama and mindfulness meditation may serve as effective supportive care interventions to enhance the QOL for hematological cancer patients undergoing chemotherapy. However, the study also highlighted the need for further research with larger sample sizes and extended follow-up periods to validate these findings and explore the long-term benefits of pranayama and mindfulness meditation in this population.

Huberty *et al*. conducted a RCTs to assess the impact of a 6-week yoga program on fatigue management in hematological cancer patients.[35] Fifty patients were randomly assigned to either a yoga intervention or standard care control group – the yoga intervention involved twice-weekly sessions lasting 60 min each. Fatigue levels were evaluated using the Functional Assessment of Chronic Illness Therapy-Fatigue scale before and after the 6-week intervention. The study found that the yoga group experienced significantly reduced fatigue scores compared to the control group. Specifically, patients in the yoga group showed marked improvements in overall, physical, and functional fatigue dimensions. These results suggest that the yoga intervention effectively alleviated fatigue symptoms in hematological cancer patients undergoing treatment. The findings support the integration of yoga into supportive care strategies for this patient population, but further research is necessary to explore the long-term benefits and optimal delivery methods for yoga interventions.

In their RCT, Cohen *et al*. investigated the impact of Tibetan yoga on the psychological well-being and sleep quality of patients with hematological cancers.[36] The participants were assigned to either the Tibetan yoga intervention group or a control group. The intervention group engaged in Tibetan yoga practice twice a week for 12 weeks, with each session lasting 60 min. The assessment of outcomes involved the use of validated questionnaires to measure psychological adjustment and sleep quality, encompassing anxiety, depression, and overall sleep disturbances. The participants in the Tibetan yoga group demonstrated significant enhancements in sleep quality and reductions in symptoms of anxiety and depression in comparison to the control group. Specifically, the yoga group substantially improved sleep onset latency, duration, and overall sleep quality.

In addition, noticeable reductions were observed in anxiety and depressive symptoms, indicating an improved psychological adjustment. This study advocates for including Tibetan yoga in comprehensive care strategies for hematological cancer patients, underscoring its potential to ameliorate mental and physical health outcomes. It is advisable to conduct further research with larger sample sizes and extended follow-up periods to validate these benefits and delve into the underlying mechanisms driving these effects.

3.1. RoB Assessment

The Cochrane RoB tool was employed to assess the RoB within the studies under review. This tool scrutinizes various domains, including sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome

data, selective reporting, and other potential sources of bias. The overall RoB present in the included studies was deemed moderate to high. The table below provides a summary of the assessments [Table 2]. This was primarily attributed to difficulties in effectively blinding participants, personnel, and outcome assessors, a common challenge in behavioral intervention studies. Most studies demonstrated adequate randomization and reported on all pre-specified outcomes. For future research endeavors, emphasis should be placed on enhancing allocation concealment and implementing strategies to mitigate biases stemming from the absence of blinding. Comprehensive reporting on allocation concealment methods and endeavors to blind outcome assessors would significantly enrich the quality and dependability of forthcoming research.

4. DISCUSSION

The findings from this review suggest that yoga can offer various benefits for patients with hematological malignancies, including improvements in physical symptoms, psychological well-being, and overall QoL. However, the heterogeneity of study designs, interventions, and outcome measures underscores the complexity of interpreting these results and highlights the need for more standardized research.

4.1. Summary of Key Findings

The included studies demonstrate that yoga interventions, whether they involve Hatha yoga, pranayama, mindfulness meditation, or Tibetan yoga, can lead to significant reductions in fatigue, emotional distress, and pain among patients with hematological malignancies. For example, Joshi *et al*. found that a daily practice of pranayama and mindfulness meditation significantly reduced emotional distress and fatigue compared to standard care.[34] Similarly, Eckert *et al*. reported that online Hatha yoga significantly reduced pain and depressive symptoms in survivors of allogenic BMT, despite challenges with adherence.[32]

4.2. Comparison with Existing Literature

The systematic reviews by Felbel *et al*. and Waddington *et al*. provide further context to these findings.[37,38] Felbel *et al*. emphasized the overall benefits of yoga in cancer care, highlighting improvements in both physical and mental health outcomes. Their review supports the notion that yoga can be a valuable adjunct to conventional cancer treatments, improving patients' ability to cope with the disease and its treatment-related side effects.

Waddington *et al*. specifically reviewed yoga interventions in hematological cancer patients and found similar benefits, particularly in reducing fatigue and improving psychological well-being. They also pointed out the variability in intervention types and outcomes measured, which complicates direct comparisons across studies. Their findings align with the need for more standardized protocols to better evaluate the efficacy of yoga interventions in this patient population.

4.3. Mechanisms of Action

Yoga's benefits in cancer care are likely multifactorial, involving both physiological and psychological mechanisms. Physiologically, yoga practices can modulate the autonomic nervous system, reduce inflammatory markers, and enhance immune function. These effects can help mitigate the side effects of cancer treatments, such as fatigue and pain. Psychologically, yoga promotes relaxation, reduces stress and anxiety, and improves mood and emotional regulation. These benefits are particularly important for patients with hematological malignancies, who often experience significant psychological distress due to the intensity and duration of their treatments.[39-44]

4.4. Practical Considerations

Integrating yoga into clinical practice for patients with hematological malignancies requires careful consideration of several factors. First, the type of yoga intervention should be tailored to the patient's physical condition and treatment schedule. For example, gentle practices such as mindful breathing and pranayama may be more suitable for patients undergoing intensive chemotherapy, while more physically demanding forms of yoga might be appropriate during recovery phases.[17]

Second, accessibility and adherence are critical. Online or app-based interventions, such as the Isha Kriya used by Chopra *et al*., offer flexibility but may face challenges with engagement and compliance.[33] Ensuring that interventions are user-friendly and providing support to maintain adherence can enhance their effectiveness.

4.5. Study Limitations

The limitations of the included studies highlight areas where future research could improve. These include small sample sizes, short intervention durations, lack of long-term follow-up, and challenges with adherence and engagement, particularly for online interventions. In addition, the open-label design of several studies introduces potential biases that could affect the outcomes.

4.6. Future Directions

Future research should focus on large-scale, high-quality RCTs to confirm the benefits of yoga for patients with hematological malignancies. These studies should aim to standardize intervention protocols and outcome measures, allowing for more robust comparisons across studies. Long-term follow-up is also essential to assess the sustainability of yoga's benefits.

In addition, exploring the biological mechanisms underlying yoga's effects can provide insights into its therapeutic potential and help refine interventions to maximize their efficacy. Finally, integrating patient preferences and feedback into the design of yoga programs can enhance their acceptability and effectiveness in clinical settings.

5. CONCLUSION

Yoga interventions have demonstrated significant potential in improving the physical and psychological well-being of patients with hematological malignancies. By reducing fatigue, pain, anxiety, and depression, yoga can enhance the overall QOL for these patients. As the field of integrative oncology continues to grow, yoga stands out as a promising supportive care modality that warrants further exploration and implementation in clinical practice. With continued research and innovation, yoga can become an integral part of comprehensive cancer care, offering holistic benefits to patients navigating the challenges of hematological malignancies.

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7. AUTHORS' CONTRIBUTIONS

All the authors contributed equally to the design and execution of the article.

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This manuscript not requires ethical approval as it is a review study.

10. CONFLICTS OF INTEREST

Nil.

11. DATA AVAILABILITY

This is an original manuscript and all data are available for only review purposes from authors.

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REFERENCES

1. Nath K, Boles R, Emeto T, Adegboye O, Castellanos M, Alele F, *et al*. A comprehensive study of the epidemiology of haematological malignancies in North Queensland. Intern Med J 2022;53:540-9.
2. Nørgaard M, Larsson H, Pedersen G, Schønheyder H, Rothman K, Sørensen H. Short-term mortality of bacteraemia in elderly patients with haematological malignancies. Br J Haematol 2005;132:25-31.
3. Soto-Pérez-de-Celis E, Martínez-Peromingo J, Chávarri-Guerra Y, Loh K, Demichelis-Gómez R, Rodrigues M, *et al*. Implementation of geriatric haematology programmes for the treatment of older people with haematological malignancies in low-resource settings. Lancet Healthy Longev 2021;2:e754-63.
4. Siddika S, Rahman A, Islam A, Siddika S, Akhtar K, Siddika A. Symptom burden of patients with haematological malignancy. Bangladesh Med Res Counc Bull 2021;46:196-203.
5. Barlow KH, Van der Pols JC, Ekberg S, Johnston EA. Cancer survivors' perspectives of dietary information provision after cancer treatment: A scoping review of the Australian context. Health Promot J Austr 2021;33:232-44.
6. Sullivan E, Rice N, Kingston E, Kelly A, Reynolds J, Feighan J, *et al*. A national survey of oncology survivors examining nutrition attitudes, problems and behaviours, and access to dietetic care throughout the cancer journey. Clin Nutr ESPEN 2021;41:331-9.
7. Lopes C, Dourado Á, Oliveira R. Phytotherapy and nutritional supplements on breast cancer. Biomed Res Int 2017;2017:7207983.
8. Oh B, Kimble B, Costa DS, Davis E, McLean A, Orme K, *et al*. Acupuncture for treatment of arthralgia secondary to aromatase inhibitor therapy in women with early breast cancer: Pilot study. Acupunct Med 2013;31:264-71.
9. Luctkar-Flude M, Groll D. A systematic review of the safety and effect of neurofeedback on fatigue and cognition. Integr Cancer Ther 2015;14:318-40.
10. Taheripanah T, Sardari M, Rezaeizadeh H. Integrative oncology: Hope or hype? J Pediatr Nephrol 2015;2:e3654.
11. Basavaraddi IV. Yoga: Its Origin, History and Development. India: Ministry of External Affairs of Government of India; 2015.
12. Cramer H, Park CL, Steel A, Gangadhar BN, Pilkington K. Yoga in prevention and therapy. Evid Based Complement Altern Med 2017;2017:2160624.
13. Pal G. Yoga for achieving perfect health. Int J Clin Exp Physiol 2022;9:61-2.
14. DiStasio SA. Integrating yoga into cancer care. Clin J Oncol Nurs 2008;12:125-30.
15. Haier J, Duda A, Branss-Tallen C. Improvement of well-being in cancer patients by yoga training. Med J Indones 2018;27:185-93.
16. Buffart LM, Van Uffelen JG, Riphagen II, Brug J, Van Mechelen W, Brown WJ, *et al*. Physical and psychosocial benefits of yoga in cancer patients and survivors, a systematic review and meta-analysis of randomized controlled trials. BMC Cancer 2012;12:559.
17. Danhauer SC, Addington EL, Sohl SJ, Chaoul A, Cohen L. Review of yoga therapy during cancer treatment. Support Care Cancer 2017;25:1357-72.
18. Danhauer SC, Addington EL, Cohen L, Sohl SJ, Van Puymbroeck M, Albinati NK, *et al*. Yoga for symptom management in oncology: A review of the evidence base and future directions for research. Cancer 2019;125:1979-89.
19. Pulte D, Jansen L, Brenner H. Changes in long term survival after diagnosis with common hematologic malignancies in the early 21st century. Blood Cancer J 2020;10:56.
20. Pedersen M, Engedal MS, Tolver A, Larsen MT, Kornblit BT, Lomborg K, *et al*. Effect of non-pharmacological interventions on symptoms and quality of life in patients with hematological malignancies-a systematic review. Crit Rev Oncol Hematol 2024;196:104327.
21. Geyer HL, Kosiorek H, Dueck AC, Scherber R, Slot S, Zweegman S, *et al*. Associations between gender, disease features and symptom burden in patients with myeloproliferative neoplasms: An analysis by the MPN QOL International Working Group. Haematologica 2017;102:85.
22. O'Connor D, Loke J, Brown M, Stanworth SJ, Young A, Prue G. Non-pharmacological supportive-care interventions in acute myeloid leukaemia: A review of randomised controlled trials. Br J Haematol 2021;195:e97-113.
23. Cramp F, Hewlett S, Almeida C, Kirwan JR, Choy EH, Chalder T, *et al*. Non-pharmacological interventions for fatigue in rheumatoid arthritis. Cochrane Database Syst Rev 2013;8:CD008322.
24. Patel SR, Zayas J, Medina-Inojosa JR, Loprinzi C, Cathcart-Rake EJ, Bhagra A, *et al*. Real-world experiences with yoga on cancer-related symptoms in women with breast cancer. Glob Adv Health Med 2021;10:2164956120984140.
25. Blank SE, Kittel J, Haberman MR. Active practice of Iyengar yoga as an intervention for breast cancer survivors. Int J Yoga Ther 2005;15:51-9.
26. Lin PJ, Peppone LJ, Janelsins MC, Mohile SG, Kamen CS, Kleckner IR, *et al*. Yoga for the management of cancer treatment-related toxicities. Curr Oncol Rep 2018;20:5.
27. Fibriansari RD, Azizah LN. Yoga therapy for improving the quality of life among breast cancer patients: Literature review. Health Technol J 2023;1:139-47.
28. Pan Y, Yang K, Wang Y, Zhang L, Liang H. Could yoga practice improve treatment-related side effects and quality of life for women with breast cancer? A systematic review and meta-analysis. Asia Pac J Clin Oncol 2017;13:e79-95.
29. Culos-Reed SN, Mackenzie MJ, Sohl SJ, Jesse MT, Zahavich AN, Danhauer SC. Yoga and cancer interventions: A review of the clinical significance of patient reported outcomes for cancer survivors. Evid Based Complement Alternat Med 2012;2012:642576.
30. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, *et al*. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ 2021;372:n71.
31. Sterne JA, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, *et al*. RoB 2: A revised tool for assessing risk of bias in randomised trials. BMJ 2019;366:l4898.
32. Eckert R, Huberty J, Laird B, Mesa R, Palmer J. A randomized pilot study of online hatha yoga for physical and psychological symptoms

among survivors of allogenic bone marrow transplant. Int J Yoga Therap 2022;32:12.
33. Chopra M, Naik RR, Naik R, Sahni J, Bala K, Ahlawat J, *et al*. Randomized controlled trial of Isha Kriya versus observation to improve quality of life in hematopoietic cell transplantation recipients. Transplant Cell Ther 2023;29:530.e1-5.
34. Joshi AM, Mehta SA, Dhakate NG, Mehta AO. Effect of pranayama and mindfulness meditation on emotional distress and fatigue in adult hematological cancer patients undergoing chemotherapy. Yoga Mimamsa 2023;55:80-7.
35. Huberty J, Eckert R, Dueck A, Kosiorek H, Larkey L, Gowin K, *et al*. Online yoga in myeloproliferative neoplasm patients: Results of a randomized pilot trial to inform future research. BMC Complement Altern Med 2019;19:121.
36. Cohen L, Warneke C, Fouladi R, Rodriguez M, Chaoul-Reich A. Psychological adjustment and sleep quality in a randomized trial of the effects of a tibetan yoga intervention in patients with lymphoma. Cancer 2004;100:2253-60.
37. Felbel S, Meerpohl JJ, Monsef I, Engert A, Skoetz N. Yoga in addition to standard care for patients with haematological malignancies. Cochrane Database Syst Rev 2014;2014:CD010146.
38. Waddington F, Amerikanou M, Brett J, Watson E, Abbots V, Dawson P, *et al*. A systematic review to explore the effectiveness of physical health and psychosocial interventions on anxiety, depression and quality of life in people living with blood cancer. J Psychosoc Oncol 2024;42:113-47.
39. Trakroo M, Bhavanani AB. Physiological benefits of yogic practices: A brief review. IJTCM 2016;1:0031-43.
40. Pascoe MC, De Manincor M, Tseberja J, Hallgren M, Baldwin PA, Parker AG. Psychobiological mechanisms underlying the mood benefits of meditation: A narrative review. Compr Psychoneuroendocrinol 2021;6:100037.
41. Singh P. Psychological benefit of yoga: An overview. Indian J Health Wellbeing 2022;13:566-8.
42. McCall M. How might yoga work? An overview of potential underlying mechanisms. J Yoga Phys Ther 2013;3:130.
43. Evans S, Tsao J, Sternlieb B, Zeltzer L. Using the biopsychosocial model to understand the health benefits of yoga. J Complement Integr Med 2009;6:1-22.
44. Büssing A, Michalsen A, Khalsa S, Telles S, Sherman K. Effects of yoga on mental and physical health: A short summary of reviews. Evid Based Complement Alternat Med 2012;2012:165410.

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Table 1: Studies included in the review and their observed assessments

Study	Title	Methods	Results
Eckert *et al*.[32]	A Randomized Pilot Study of Online Hatha Yoga for Physical and Psychological Symptoms Among Survivors of Allogenic Bone Marrow Transplant	72 participants; online yoga versus podcast control; outcomes included Lee Symptom Score, physical function, fatigue, anxiety, sleep disturbance, social functioning, pain interference, depression, and QoL	Significant reduction in pain and depressive symptoms in yoga group; feasibility challenges with low adherence and high dropout rate
Chopra *et al*.[33]	Randomized Controlled Trial of Isha Kriya versus Observation to Improve Quality of Life in Hematopoietic Cell Transplantation Recipients	72 HCT recipients; Isha Kriya versus observation; QoL assessed using FACT-BMT and PROMIS-GH questionnaires	No significant differences in overall QoL; transient improvement in BMT-specific QoL subscale scores at day+30, not sustained at day+100
Joshi *et al*.[34]	Effect of Pranayama and Mindfulness Meditation on Emotional Distress and Fatigue in Adult Hematological Cancer Patients Undergoing Chemotherapy	27 patients; pranayama and mindfulness meditation versus standard care; emotional distress and fatigue assessed using ET and FAS	Significant reductions in emotional distress, anxiety, anger, need for help, and fatigue in intervention group compared to control group
Cohen *et al*.[35]	Psychological Adjustment and Sleep Quality in a Randomized Trial of the Effects of a Tibetan Yoga	Hematological cancer patients; Tibetan yoga versus control; outcomes measured using validated questionnaires for psychological adjustment and sleep quality	Significant improvements in sleep quality and reductions in anxiety and depression in yoga group compared to control
Huberty *et al*.[36]	Yoga for Fatigue Management in Hematological Cancer Patients: A Randomized Controlled Trial	50 patients; 6-week yoga intervention versus standard care; fatigue measured using FACIT-F scale	Significant reductions in fatigue scores in yoga group compared to control

RCT: Randomized Controlled Trial, HCT: Hematopoietic Cell Transplantation, QoL: Quality of Life, FACT-BMT: Functional Assessment of Cancer Therapy-Bone Marrow Transplantation, PROMIS-GH: Patient-Reported Outcomes Measurement Information System Global Health, ET: Emotion Thermometer, FAS: Fatigue Assessment Scale, FACIT-F: Functional Assessment of Chronic Illness Therapy-Fatigue

Table 2: Risk of bias for each study across different domains.

Study	Sequence Generation	Allocation Concealment	Blinding of Participants and Personnel	Blinding of Outcome Assessment	Incomplete Outcome Data	Selective Reporting	Other Sources of Bias
Eckert *et al*.[32]	Low risk	Unclear risk	High risk	High risk	High risk	Low risk	Low risk
Chopra *et al*.[33]	Low risk	Unclear risk	High risk	High risk	Low risk	Low risk	Low risk
Joshi *et al*.[34]	Low risk	Unclear risk	High risk	High risk	Low risk	Low risk	Low risk
Cohen *et al*.[35]	Low risk	Unclear risk	High risk	High risk	Low risk	Low risk	Low risk
Huberty *et al*.[36]	Low risk	Unclear risk	High risk	High risk	Low risk	Low risk	Low risk

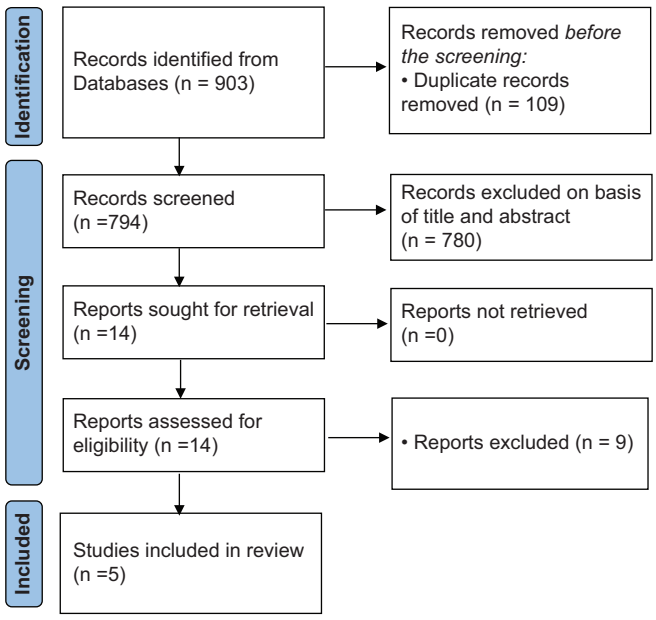

Figure 1: Summarized search strategy (Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram)