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Review Article

Restoring rest: exploring yoga's influence on sleep quality in cancer patients

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ABSTRACT

Sleep disturbances are prevalent among cancer patients, significantly impacting their quality of life and prognosis. Yoga, an ancient mind-body practice, is increasingly recognized for its potential to improve sleep quality in this population. This narrative review explores yoga's impact on sleep quality in cancer patients, examining mechanisms, scientific evidence, and implications for future research and clinical practice. Yoga enhances sleep through psychological and physiological mechanisms. Practices like asanas, pranayama, and meditation activate the parasympathetic nervous system, promoting relaxation and reducing stress. Additionally, yoga promotes mindfulness, helping individuals manage psychological distress and improve sleep quality by reducing rumination and anxiety.

Numerous studies, including randomized controlled trials, demonstrate significant improvements in sleep parameters among cancer patients practicing yoga. Meta-analyses and systematic reviews further support these findings, highlighting yoga's broad applicability and effectiveness.

However, existing research has methodological limitations, such as variability in intervention protocols and reliance on self-reported sleep measures. Future research should focus on larger, more diverse populations and employ objective sleep assessments to validate findings. Investigating long-term effects and identifying effective practices for different patient subgroups are essential. In conclusion, yoga holds significant potential as a therapeutic intervention for improving sleep quality in cancer patients. Integrating yoga into standard cancer care can effectively address sleep disturbances and enhance well-being. Ongoing research and innovative approaches are needed to fully harness yoga's therapeutic potential, ensuring evidence-based practices that improve patient outcomes.

Keywords: Yoga, Sleep quality, Cancer patients, Mind-body practice, Therapeutic intervention

INTRODUCTION

Cancer patients frequently experience sleep disturbances, significantly impacting their quality of life and overall prognosis.[1,2] These disturbances can include insomnia, restless legs syndrome, and sleep apnea, among other issues. The presence of sleep disturbances exacerbates fatigue, reduces pain tolerance, and impairs cognitive function, thereby affecting the patient's ability to cope with cancer treatment.[3] Addressing sleep quality in cancer care is crucial because poor sleep not only diminishes the quality of life but can also potentially worsen cancer prognosis by affecting immune function and overall physical resilience. One of the primary reasons sleep disturbances are prevalent among cancer patients is the multifaceted nature of the disease and its treatment.[4] Pain and stress are significant contributors, often stemming directly from the cancer itself or the aggressive treatments required to combat it.[5] Chemotherapy, radiation, and other cancer treatments are known to have side effects that disrupt normal sleep patterns. Medications can cause insomnia or lead to fragmented, restless sleep.[6] Additionally, the physical and emotional stress associated with a cancer diagnosis and ongoing treatment can result

in heightened anxiety and depression, further disrupting sleep.[7,8]

Changes in physical activity levels also play a role in sleep disturbances among cancer patients. Fatigue resulting from the disease and its treatment often leads to decreased physical activity, which can, in turn, affect sleep quality.[9] Physical inactivity is known to disrupt the body's natural circadian rhythms, which are crucial for maintaining healthy sleep patterns.[10] The circadian rhythm, the body's internal clock, regulates the sleep-wake cycle and is influenced by external factors such as light and darkness.[11] Exposure to natural sunlight helps regulate this rhythm, influencing when a person feels sleepy or awake. Hospital stays, irregular treatment schedules, and lack of exposure to natural light can all disrupt the circadian rhythm in cancer patients, leading to significant sleep disturbances.[12,13]

Neurotransmitters and hormones also play critical roles in sleep regulation.[14,15] Serotonin, a neurotransmitter involved in mood regulation, helps promote sleep, while others like dopamine and norepinephrine are involved in wakefulness. The hypothalamus, often referred to as the body's "internal clock," produces hormones such as melatonin that induce sleepiness and regulate other processes influencing sleep.[16,17] In cancer patients, the regulation of these neurotransmitters and hormones can be disrupted by stress, treatment side effects, and the disease itself, leading to significant sleep disturbances.

Given the importance of sleep quality in cancer care, identifying effective interventions to address sleep disturbances is essential. Yoga, a mind-body practice, has emerged as a promising intervention for improving sleep quality among cancer patients.[18] Yoga incorporates physical postures, breathing exercises, and meditation, which collectively contribute to relaxation, stress reduction, and improved overall well-being. Research indicates that yoga can significantly reduce insomnia, improve sleep efficiency, and extend sleep duration among cancer patients.[19] These improvements in sleep quality are linked to reduced levels of stress and anxiety, enhanced physical relaxation, and better regulation of the sleep-wake cycle.

Enhancing caregiver resilience through yoga is also crucial for the well-being of both caregivers and cancer patients. Caregivers often experience significant psychological distress due to the demanding nature of their role.[20] Yoga can help mitigate this distress by promoting self-compassion and self-care, equipping caregivers with tools to navigate their demanding roles more effectively.

This narrative review explores yoga's impact on sleep quality in cancer patients, emphasizing its therapeutic potential. We cover the prevalence and effects of sleep disturbances, mechanisms of yoga's benefits, scientific evidence of efficacy, and practical considerations for implementation. By integrating existing evidence and identifying research gaps, we aim to support incorporating yoga into standard cancer care protocols to address sleep disturbances effectively.

UNDERSTANDING SLEEP DISTURBANCES IN CANCER PATIENTS

Sleep disturbances are a prevalent and distressing issue among cancer patients, significantly impacting their quality of life and prognosis.[21] These disturbances include insomnia, fragmented sleep, early morning awakenings, and excessive daytime sleepiness. Studies indicate that nearly 50% to 70% of cancer patients experience sleep disorders during treatment, a notably higher rate compared to the general population.[22]

Poor sleep profoundly affects both the physical and psychological well-being of cancer patients. It exacerbates fatigue, a common and debilitating symptom, reducing their ability to cope with daily activities and lowering their overall quality of life.[23] Additionally, inadequate sleep is linked to heightened levels of pain, increased emotional distress, and a diminished response to cancer treatment.[24] These factors collectively contribute to a poorer prognosis, underscoring the critical need to address sleep quality in cancer care.

Several factors contribute to the high prevalence of sleep disturbances in cancer patients.[25] Pain, one of the most significant, disrupts sleep patterns and leads to frequent awakenings. Stress and anxiety related to diagnosis, treatment, and uncertainty about the future also disrupt sleep. Cancer treatments like chemotherapy, radiation, and surgery can cause side effects such as nausea, vomiting, hot flashes, and hormonal imbalances that interfere with sleep.[26] Medications prescribed to manage cancer symptoms or treatment side effects, including steroids, opioids, and antiemetics, can also adversely affect sleep patterns.

Changes in physical activity levels due to illness and treatment can further contribute to sleep disturbances.[27] Reduced physical activity can lead to decreased fatigue, altering the body's natural sleep-wake cycle and making it harder to fall or stay asleep. Additionally, the hospital environment, with its noise, light, and frequent interruptions, can disrupt the natural sleep rhythm of cancer patients, particularly those undergoing inpatient treatment.[28]

Understanding the mechanisms involved in sleep regulation is crucial. The sleep-wake cycle, or circadian rhythm, is influenced by light and darkness.[29] Natural sunlight exposure helps regulate this rhythm and can influence when individuals feel sleepy or awake. Neurotransmitters such as serotonin, are involved in mood regulation, and promote sleep, while others like dopamine and norepinephrine are involved in wakefulness. The hypothalamus, the body's "internal

clock," plays a key role in regulating this cycle by producing hormones like melatonin, which induces sleep.[30,31]

Addressing sleep disturbances requires a holistic approach that considers these multifaceted issues, integrating strategies to manage pain, reduce stress, and mitigate treatment side effects. Incorporating mind-body practices like yoga, which promotes relaxation and stress reduction, can be a promising intervention to enhance sleep quality in this population. The high prevalence of sleep disorders highlights the need for comprehensive approaches to manage and improve sleep quality. By understanding the underlying factors contributing to sleep disturbances, healthcare providers can develop targeted interventions to support the well-being of cancer patients and optimize their overall care.

THEORETICAL FRAMEWORK OF YOGA IN IMPROVING SLEEP

Yoga, an ancient mind-body practice, is increasingly recognized for its potential to improve sleep quality, particularly in populations experiencing significant stress, such as cancer patients.[32] Understanding yoga's impact on sleep involves exploring both psychological and physiological pathways.

Yoga practices, including physical postures (asanas), breathing exercises (pranayama), and meditation (dhyana), promote relaxation and reduce stress. Stress reduction is crucial because chronic stress significantly contributes to sleep disturbances. Yoga helps lower cortisol levels, a stress hormone, and increases the production of gamma-aminobutyric acid (GABA), a neurotransmitter that calms the nervous system. These biochemical changes create a relaxation conducive to sleep.[33]

From a psychological perspective, yoga promotes mindfulness and mind-body awareness, which are critical for improving sleep quality.[34] Mindfulness practices in yoga teach individuals to stay present and develop a non-judgmental awareness of their thoughts and emotions. This heightened mindfulness can reduce rumination and anxiety, common barriers to falling and staying asleep. By fostering a sense of inner calm and emotional balance, yoga helps alleviate psychological factors that disrupt sleep.

Physiologically, yoga influences the autonomic nervous system (ANS) by enhancing parasympathetic activity, responsible for the body's "rest and digest" functions35. This shift from the sympathetic nervous system, which governs the "fight or flight" response, to the parasympathetic state promotes relaxation and sleep readiness. Yoga practices also regulate the hypothalamic-pituitary-adrenal (HPA) axis, reducing the body's stress response and promoting hormonal balance, including the production of melatonin, which regulates sleep-wake cycles.[36,37]

Theories supporting yoga's efficacy for improving sleep include the mind-body connection and relaxation response theories. The mind-body connection theory posits that mental states, such as stress and anxiety, significantly impact physical health and sleep patterns. By integrating physical and mental practices, yoga helps align the mind and body, promoting overall well-being and better sleep.[38]

The relaxation response theory, introduced by Dr. Herbert Benson, explains how practices like yoga elicit a state of deep relaxation that counteracts the physiological effects of stress. This relaxation response is characterized by decreased heart rate, lower blood pressure, and reduced muscle tension, all of which contribute to improved sleep quality. Regular yoga practice trains the body to enter this state more easily, facilitating better sleep.[39]

Yoga's impact on neurotransmitters and brain structures involved in sleep regulation further supports its efficacy. The theoretical framework of yoga in improving sleep encompasses both psychological and physiological pathways. By reducing stress, enhancing mindfulness, and regulating the ANS and HPA axis, yoga offers a comprehensive approach to improving sleep quality. The integration of relevant theories and scientific evidence highlights yoga's potential as an effective intervention for sleep disturbances in cancer patients, addressing both mental and physical aspects of sleep regulation.

SCIENTIFIC EVIDENCE SUPPORTING YOGA FOR SLEEP IMPROVEMENT

A growing body of scientific literature supports the use of yoga as an effective intervention for improving sleep quality in cancer patients. This section reviews key studies, meta-analyses, and systematic reviews, and examines existing research's methodological approaches and limitations.

Review of studies investigating the effects of yoga on sleep in cancer patients.

Numerous studies have investigated the impact of yoga on sleep disturbances in cancer patients. A notable randomized controlled trial by Mustian et al. (2013) explored the effects of a specialized yoga program called Yoga for Cancer Survivors (YOCAS) on sleep quality among cancer survivors with insomnia. The study found significant improvements in sleep efficiency, total sleep time, and sleep latency among participants in the yoga group compared to the control group receiving standard care.[40]

Another study by Danhauer et al evaluated the effects of a 10-week restorative yoga intervention on sleep quality in breast cancer survivors. The results indicated that

participants who practiced yoga reported significantly reduced sleep disturbances, improved sleep duration, and better overall sleep quality than those in the control group.[41]

Furthermore, a study conducted by Carlson et al examined the impact of an 8-week Mindfulness-Based Stress Reduction (MBSR) program, which includes yoga, on sleep disturbances in cancer patients. The findings showed that the intervention group experienced significant reductions in sleep disturbances and improvements in sleep quality and duration compared to the control group.[42]

Meta-analyses and systematic reviews on yoga and sleep quality

Meta-analyses and systematic reviews provide comprehensive evaluations of the overall efficacy of yoga for sleep improvement. A meta-analysis of randomized controlled trials assessing the effects of yoga on Yoga, Psychosocial, and mindfulness-based Interventions for Cancer-Related Fatigue concluded that yoga significantly improved several aspects of sleep, including sleep quality, sleep efficiency, and total sleep time.[43]

Another systematic review focused specifically on breast cancer survivors and the effects of yoga on sleep. The review found that yoga interventions were associated with moderate to large improvements in sleep quality and reductions in sleep disturbances.[44]

These meta-analyses and systematic reviews underscore the potential of yoga as a non-pharmacological intervention for enhancing sleep quality in cancer patients, highlighting its broad applicability and effectiveness.

Examination of methodological approaches and limitations in existing research

While the evidence supporting yoga for sleep improvement in cancer patients is compelling, it is essential to acknowledge the methodological limitations present in existing research. One common limitation is the variation in yoga intervention protocols across studies, including differences in the type of yoga practiced, session duration, frequency, and instructor qualifications. This variability makes it challenging to standardize findings and draw definitive conclusions.

Another limitation is the reliance on self-reported sleep measures, which can be subjective and susceptible to bias. Future research should incorporate objective measures of sleep, such as polysomnography or actigraphy, to provide more accurate assessments of sleep quality and patterns.

Additionally, many studies have relatively small sample sizes and short follow-up periods, limiting the generalizability and long-term applicability of the findings. Larger, well-designed randomized controlled trials with diverse populations and extended follow-up periods are necessary to confirm the efficacy of yoga for sleep improvement in cancer patients.

In conclusion, the scientific evidence supports the beneficial effects of yoga on sleep quality in cancer patients, with numerous studies and meta-analyses demonstrating significant improvements in various sleep parameters. However, addressing methodological limitations in future research is crucial to strengthen the evidence base and optimize the implementation of yoga interventions in cancer care.

MECHANISMS OF ACTION: HOW YOGA ENHANCES SLEEP QUALITY

Yoga enhances sleep quality through interconnected psychological and physiological mechanisms. Primarily, it reduces stress via relaxation techniques, including physical postures (asanas), breathing exercises (pranayama), and meditation. These practices activate the parasympathetic nervous system, promoting relaxation and calm, crucial for cancer patients experiencing high anxiety and tension. Mindfulness, integral to yoga, encourages focusing on the present moment, reducing rumination and anxiety that interfere with sleep. Yoga helps patients develop emotional regulation and resilience by fostering a mindful state and improving sleep quality.[43]

Physiologically, yoga regulates the autonomic nervous system (ANS) and hormonal balance. Yoga shifts the ANS from sympathetic dominance (stress and arousal) to parasympathetic dominance (relaxation and recovery), resulting in decreased heart rate, lower blood pressure, and reduced stress hormones like cortisol.[45] These changes contribute to better sleep quality.

Additionally, yoga influences neurotransmitters and hormones that regulate sleep. Serotonin, involved in mood regulation, is enhanced by yoga, promoting melatonin production, the hormone responsible for sleep-wake cycles.[46] The hypothalamus, regulating circadian rhythms, is positively affected by yoga, improving synchronization of sleep patterns with natural light-dark cycles.

Yoga also addresses factors like pain, stress, medication side effects, and changes in physical activity that significantly contribute to sleep disturbances in cancer patients. It alleviates pain through gentle stretching and movement, reduces stress through relaxation and mindfulness, and counteracts medication side effects by improving overall physiological function. These benefits help normalize sleep patterns and reduce the amount of sleep needed to feel rested.[47] Furthermore, yoga influences circadian rhythm. Light exposure, especially during outdoor yoga sessions, helps regulate this rhythm,

promoting a healthier sleep-wake cycle. Yoga's emphasis on consistent practice and routine can reinforce stable sleep patterns, aiding in managing insomnia and other sleep disturbances common among cancer patients.

In conclusion, yoga enhances sleep quality through stress reduction, mindfulness, ANS regulation, and hormonal balance. By addressing psychological and physiological factors, yoga offers a holistic intervention that significantly improves sleep quality and well-being in cancer patients. Integrating yoga into cancer care protocols could be a valuable strategy for managing sleep disturbances and enhancing the quality of life for these patients.

IMPLEMENTING AND PERSONALIZING YOGA IN CANCER CARE

Implementing yoga in cancer care requires careful consideration of the practices most suitable for improving sleep, such as gentle asanas, pranayama, and meditation. Safety adaptations are essential to accommodate the physical limitations and side effects experienced by patients undergoing treatment. Integrating yoga into multidisciplinary cancer care programs ensures a holistic approach to patient well-being. Personalizing yoga interventions based on individual sleep patterns and preferences enhances their effectiveness. Certified yoga instructors and healthcare professionals are crucial in tailoring and guiding these interventions. Continuous monitoring and adjustment based on patient feedback are vital to ensure optimal outcomes and sustained benefits.

FUTURE DIRECTIONS AND RESEARCH IMPLICATIONS

Despite promising findings on the benefits of yoga for improving sleep in cancer patients, significant gaps remain in the literature. Future research should focus on larger, more diverse populations to validate these results and explore the long-term effects of yoga on sleep quality. Integrating technology-based interventions, such as virtual yoga sessions and mobile health applications, offers new avenues for making yoga more accessible to cancer patients. This can facilitate personalized care and continuous monitoring, thereby enhancing the effectiveness of yoga interventions. Recommendations for future studies include employing rigorous methodologies, such as randomized controlled trials with adequate sample sizes and objective sleep measures. It is also essential to investigate the specific mechanisms through which yoga influences sleep and to identify the most effective yoga practices for different patient subgroups.

CONCLUSION

Yoga holds significant potential for improving sleep quality in cancer patients, contributing to better overall well-being. Numerous studies and meta-analyses demonstrate that yoga can significantly improve various sleep parameters, such as sleep quality, efficiency, and duration, by addressing psychological and physiological factors. Integrating yoga into standard cancer care protocols can effectively address sleep disturbances, benefiting patients and caregivers. Ongoing research and innovative approaches are needed to carefully harness yoga's therapeutic potential in cancer. Healthcare providers can enhance patient outcomes and optimize overall care by ensuring evidence-based practices.

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REFERENCES

1. Hofmeister D, Schulte T, Mehnert-Theuerkauf A. The association between sleep problems and general quality of life in cancer patients and in the general population. Front Psychol. 2022;13:960029.
2. Al Maqbali M, Al Sinani M, Alsayed A, Gleason AM. Prevalence of sleep disturbance in patients with cancer: a systematic review and meta-analysis. Clin Nurs Res. 2022;31(6):1107.
3. Grassi L, Zachariae R, Caruso R. Insomnia in adult patients with cancer: ESMO clinical practice guideline. ESMO Open. 2023;8(6):102047.
4. Pinucci I, Maraone A, Tarsitani L, Pasquini M. Insomnia among Cancer Patients in the Real World: Optimising Treatments and Tailored Therapies. Int J Environ Res Public Health. 2023;20:5.
5. Palesh O, Peppone L, Innominato PF. Prevalence, putative mechanisms, and current management of sleep problems during chemotherapy for cancer. Nat Sci Sleep. 2012;4:151.
6. Sillah A, Peters U, Watson NF. Associating sleep problems with advanced cancer diagnosis, and immune checkpoint treatment outcomes: a pilot study. Supportive Care in Cancer. 2022;30(5):3829.

7. Smith HR. Depression in cancer patients: Pathogenesis, implications and treatment (Review). Oncol Lett. 2015;9(4):1509.
8. Die Trill M. Anxiety and sleep disorders in cancer patients. EJC Supplements. 2013;11(2):216.
9. Janjua S, Brown M, Parker R, Prue G, Closier P, Cramp F. Physical activity for the management of cancer-related fatigue in adults. Cochrane Database Syst Rev. 2022;12:15348.
10. Alnawwar MA, Alraddadi MI, Algethmi RA, Salem GA, Salem MA, Alharbi AA. The effect of physical activity on sleep quality and sleep disorder: a systematic review. Cureus. 2023;15(8):43995.
11. Potter GDM, Skene DJ, Arendt J, Cade JE, Grant PJ, Hardie LJ. Circadian rhythm and sleep disruption: causes, metabolic consequences, and countermeasures. Endocr Rev. 2016;37(6):584.
12. Morse AM, Bender E. Sleep in hospitalized patients. Clocks Sleep. 2019;1(1):151.
13. Zhou L, Zhang Z, Nice E, Huang C, Zhang W, Tang Y. Circadian rhythms and cancers: the intrinsic links and therapeutic potentials. J Hema Oncol. 2022;15:1:1-31.
14. Oh J, Petersen C, Walsh CM, Bittencourt JC, Neylan TC, Grinberg LT. The role of co-neurotransmitters in sleep and wake regulation. Mol Psychiatry. 2019;24(9):1284.
15. Siegel JM. The neurotransmitters of sleep. J Clin Psychiatry. 2004;65(16):4.
16. Reddy S, Reddy V, Sharma S. Physiology, Circadian Rhythm. StatPearls. Available at: https://www.ncbi.nlm.nih.gov. Accessed on May 27 2024.
17. Van Drunen R, Eckel-Mahan K. Circadian rhythms of the hypothalamus: from function to physiology. Clocks Sleep. 2021;3(1):189.
18. Mustian KM. Yoga as treatment for insomnia among cancer patients and survivors: a systematic review. Eur Med J Oncol. 2013;1:106.
19. Mustian KM, Janelsins M, Peppone LJ, Kamen C. Yoga for the treatment of insomnia among cancer patients: evidence, mechanisms of action, and clinical recommendations. Oncol Hematol Rev. 2014;10(2):164.
20. Vitaliano PP, Strachan E, Dansie E, Goldberg J, Buchwald D. Does caregiving cause psychological distress? the case for familial and genetic vulnerabilities in female twins. Ann Behav Med. 2014;47(2):198.
21. Jakobsen G, Gjeilo KH, Hjermstad MJ, Klepstad P. An update on prevalence, assessment, and risk factors for sleep disturbances in patients with advanced cancer-implications for health care providers and clinical research. Cancers (Basel). 2022;14:16.
22. Büttner-Teleagă A, Kim YT, Osel T, Richter K. Sleep disorders in cancer-a systematic review. Int J Environ Res Public Health. 2021;18:21.
23. Momayyezi M, Fallahzadeh H, Farzaneh F, Momayyezi M. Sleep Quality and Cancer-Related Fatigue in Patients with Cancer. J Caring Sci. 2021;10(3):145.
24. Medic G, Wille M, Hemels MEH. Short- and long-term health consequences of sleep disruption. Nat Sci Sleep. 2017;9:151.
25. Fiorentino L, Ancoli-Israel S. Sleep dysfunction in patients with cancer. Curr Treat Options Neurol. 2007;9(5):337.
26. Fisher WI, Johnson AK, Elkins GR. Risk factors, pathophysiology, and treatment of hot flashes in cancer. CA Cancer J Clin. 2013;63(3):167.
27. Alnawwar MA, Alraddadi MI, Algethmi RA, Salem GA, Salem MA, Alharbi AA. The effect of physical activity on sleep quality and sleep disorder: a systematic review. Cureus. 2023;15(8).
28. Linder LA, Christian BJ. Characteristics of the nighttime hospital bedside care environment (sound, light, and temperature) for children with cancer. Cancer Nurs. 2011;34(3):176.
29. Blume C, Garbazza C, Spitschan M. Effects of light on human circadian rhythms, sleep and mood. Somnologie. 2019;23(3):147.
30. Arendt J, Aulinas A. Physiology of the pineal gland and melatonin. Endotext.2022. Available at: https://www.ncbi.nlm.nih.gov. Accessed on May 30 2024.
31. Naz SS, Shafiq MM, Albreiki M, Naz SS, Shafiq MM, Albreiki M. Interaction between melatonin, sleepiness-alertness and body temperature. sleep medicine-asleep or awake? Published online. 2023.11:49.
32. Woodyard C. Exploring the therapeutic effects of yoga and its ability to increase quality of life. Int J Yoga. 2011;4(2):49.
33. Streeter CC, Jensen JE, Perlmutter RM. Yoga Asana sessions increase brain GABA levels: a pilot study. J Altern Complement Med. 2007;13(4):419-26.
34. Kumar AP, Dhamodhini KS. Role of yoga in stress management and implications in major depression disorder. J Ayurveda Integr Med. 2023;14(5):100767.
35. Moszeik EN, Von Oertzen T, Renner KH. Effectiveness of a short Yoga Nidra meditation on stress, sleep, and well-being in a large and diverse sample. Current Psychology. 2022;41(8):5272-86.
36. Gautam S, Kiran UV. Clinical effects of yoga and meditational practices on the holistic health of chronic kidney disease patients: a systematic review. Cureus. 2024;16(4).

37. Arora S, Bhattacharjee J. Modulation of immune responses in stress by Yoga. Int J Yoga. 2008;1(2):45.
38. Büssing A, Michalsen A, Khalsa SBS, Telles S, Sherman KJ. Effects of yoga on mental and physical health: a short summary of reviews. Evid Based Complement Alternat Med. 2012;16:5410.
39. Bankar MA, Chaudhari SK, Chaudhari KD. Impact of long-term Yoga practice on sleep quality and quality of life in the elderly. J Ayurveda Integr Med. 2013;4(1):28.
40. Mustian KM, Sprod LK, Janelsins M. Multicentre, randomized controlled trial of yoga for sleep quality among cancer survivors. J Clin Oncol. 2013;31(26):3233-41.
41. Danhauer SC, Mihalko SL, Russell GB. Restorative yoga for women with breast cancer: findings from a randomized pilot study. Psycho oncology. 2009;18(4):360.
42. Carlson LE, Garland SN. Impact of mindfulness-based stress reduction (MBSR) on sleep, mood, stress and fatigue symptoms in cancer outpatients. Int J Behav Med. 2005;12(4):278-85.
43. Haussmann A, Schmidt ME, Illmann ML. Meta-analysis of randomized controlled trials on yoga, psychosocial, and mindfulness-based interventions for cancer-related fatigue: what intervention characteristics are related to higher efficacy? Cancers (Basel). 2022;14(8).
44. Cramer H, Lauche R, Klose P, Lange S, Langhorst J, Dobos GJ. Yoga for improving health-related quality of life, mental health and cancer-related symptoms in women diagnosed with breast cancer. Cochrane Database Syst Rev. 2017;1:17.
45. Stritter W, Everding J, Luchte J, Eggert A, Seifert G. Yoga, Meditation and Mindfulness in pediatric oncology-A review of literature. Complement Ther Med. 2021;63:102791.
46. Panjwani U, Dudani S, Wadhwa M. Sleep, cognition, and yoga. Int J Yoga. 2021;14(2):100.
47. Rao RM, Amritanshu R, Vinutha HT, et al. Role of Yoga in Cancer Patients: Expectations, Benefits, and Risks: A Review. Indian J Palliat Care. 2017;23(3):225.

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