

**EFFICACY OF YOGA AS COMPLEMENTARY THERAPY IN MANAGING CHEMOTHERAPY-INDUCED NAUSEA AND VOMITING: A COMPREHENSIVE REVIEW****\*Dr. Selvaraj Giridharan**

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**Abstract**

This review explores the impact of yoga as a complementary therapy in managing chemotherapy-induced nausea and vomiting (CINV). It examines various studies to assess the effectiveness of yoga practices in reducing the incidence and severity of CINV among cancer patients. The review synthesizes findings from randomized clinical trials, highlighting the potential benefits of yoga in improving patients' quality of life and offering a non-pharmacological option for CINV management. The findings suggest that yoga could be a viable complementary therapy in CINV management, offering numerous benefits and improving patients' quality of life.

**Keywords:** Yoga, Cancer, CINV, Chemotherapy, Nausea, QOL.

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**INTRODUCTION**

The global burden of cancer is substantial, with varying incidence rates across different regions and populations. Breast cancer, for example, has seen a significant increase in global incidence, with a rise from 641,000 cases in 1980 to 1,643,000 cases in 2010, representing an annual increase of 3.1%.<sup>1</sup> Similarly, testicular cancer, lung cancer, stomach cancer, colorectal cancer, and other malignancies have also demonstrated changing trends in global incidence rates, with variations observed across different continents and countries.<sup>2-6</sup>

**Cancer and CINV**

The treatment of cancer involves diverse modalities such as chemotherapy, surgery, radiation therapy, and targeted therapies. Chemotherapy, in particular, is a widely used treatment approach for various types of cancer. However, chemotherapy-induced nausea and vomiting (CINV) remains a significant challenge in the management of cancer patients undergoing chemotherapy. The incidence of CINV varies depending on the emetogenic potential of the chemotherapeutic agents used, with many patients experiencing these distressing side effects.<sup>7</sup> The impact of CINV on the quality of life (QoL) of cancer patients is profound. It can lead to decreased compliance with oncologic therapies, affect treatment decisions, and contribute to malnutrition and reduced overall well-being. The fear of nausea and vomiting is a significant concern for cancer patients, highlighting the substantial impact of CINV on their treatment experience. Furthermore, CINV can have psychological implications, contributing to distress and decreased QoL for cancer patients. Efforts to address CINV have led to developing and evaluating various antiemetic agents and supportive care interventions. Studies have investigated the effectiveness of different antiemetic regimens, including the use of 5-HT<sub>3</sub> receptor antagonists, corticosteroids, neurokinin-1 (NK1) receptor antagonists, and

other pharmacological and non-pharmacological approaches to manage CINV.<sup>8-11</sup> Additionally, research has explored the potential of complementary therapies, such as ginger and progressive muscle relaxation training, in managing CINV.<sup>12,13</sup>

**Types of CINV**

CINV can be categorized into three forms: acute emesis, delayed emesis and anticipatory emesis.<sup>14</sup> The acute phase, occurring within 24 hours after chemotherapy, is primarily mediated by the release of 5-hydroxytryptamine (5-HT).<sup>15</sup> This neurotransmitter activates the serotonin (5-HT<sub>3</sub>) pathway, leading to stimulation of the chemoreceptor trigger zone (CTZ) and vomiting centre (VC) regions, resulting in nausea and vomiting.<sup>16</sup> The delayed phase, which occurs one to five days after chemotherapy, involves different mechanisms, including the overlap of acute and delayed CINV and the activation of the neurokinin-1 (NK-1) receptor pathway.<sup>17</sup> Additionally, the involvement of additional pathways beyond serotonin and dopamine in the development of CINV has been suggested, indicating the complexity of its pathophysiology.<sup>18</sup> The pathophysiology of CINV is not fully understood, and there are inter-individual differences in the occurrence and severity of CINV, suggesting a potential role of genetic polymorphisms in its development.<sup>19,20</sup> Moreover, female sex has been identified as a risk factor for developing CINV, although the underlying mechanism is not fully understood.<sup>21</sup> The development of CINV is also influenced by the type of chemotherapy regimen, with combination chemotherapy being more emetogenic than single agents, and the mode of administration impacting the occurrence of acute and delayed CINV.<sup>22</sup> Anticipatory chemotherapy-induced nausea and vomiting (CINV) is a conditioned response that occurs prior to the administration of chemotherapy, often as a result of previous negative experiences with treatment. Poor control of CINV in previous cycles has been associated with the development of anticipatory CINV in subsequent cycles.<sup>23</sup> Anticipatory CINV is a significant challenge for cancer patients and their healthcare providers, as it can lead to increased distress and anxiety, further impacting the overall well-being of patients undergoing chemotherapy.<sup>24</sup> The development of anticipatory

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CINV is a complex phenomenon influenced by various factors, including psychological and behavioural aspects, as well as the emetogenic potential of the chemotherapy regimen.<sup>25</sup> In addition to medical management the potential role of complementary therapies in the treatment of anticipatory CINV has been explored, indicating the diverse approaches that can be considered to address this challenging aspect of CINV.<sup>26</sup> It is essential for healthcare providers to recognize the impact of anticipatory CINV on patients and to implement strategies aimed at preventing and managing this distressing condition to improve the overall chemotherapy experience for cancer patients.<sup>27</sup>

### Treatment of CINV

To manage chemotherapy-induced nausea and vomiting (CINV), various non-pharmacological approaches have been explored. These approaches aim to complement traditional antiemetic medications and improve the overall management of CINV. One such approach is the use of acupuncture, which has been identified as an appropriate adjunctive treatment for CINV.<sup>28</sup> Acupuncture has shown promise in alleviating chemotherapy-induced nausea and vomiting, although additional studies are needed to further establish its efficacy. Hypnosis has also been investigated as a potential intervention for managing CINV. A systematic review of the research evidence on hypnosis for cancer chemotherapy-induced nausea and vomiting revealed positive findings, suggesting that hypnosis may be effective in addressing CINV.<sup>29</sup> This non-pharmacological approach offers a complementary strategy for managing CINV and warrants further exploration in clinical settings. Furthermore, electroacupuncture has been studied for its potential in controlling myeloablative chemotherapy-induced emesis. The use of electroacupuncture has shown promise in managing the severe nature of chemotherapy-induced emesis, indicating its potential as a non-pharmacological intervention for CINV.<sup>30</sup> In addition to these non-pharmacological interventions, dietary modifications and nutritional support have been recognized as important in managing CINV. Chemotherapy-induced nausea and vomiting can significantly impact nutrition and dietary intake, leading to malnutrition and reduced quality of life.<sup>31</sup> Therefore, optimizing dietetics practice and addressing malnutrition are essential components of comprehensive CINV management. These non-pharmacological approaches, including acupuncture, hypnosis, electroacupuncture, and dietary interventions, offer complementary strategies for controlling chemotherapy-induced nausea and vomiting. Integrating these approaches with traditional antiemetic medications can contribute to a more comprehensive and effective management of CINV, ultimately improving the quality of life for cancer patients undergoing chemotherapy.

### Yoga and Cancer

The origins of yoga trace back to ancient India, where it was developed as a practice to unify the mind and body. In modern times, yoga is emerging as a notable complementary approach in the realm of cancer care, offering numerous physical and psychological advantages for both patients and survivors. Extensive research, including systematic reviews and meta-analyses, has underscored yoga's beneficial impact on those with cancer. For instance, Cramer et al. revealed that breast cancer patients engaging in yoga experienced significant short-term psychological health benefits.<sup>32</sup> Similarly, Buffart et al.

noted improvements in fitness and psychosocial well-being in cancer patients and survivors who practiced yoga.<sup>33</sup> Recent research by Saraswathi et al. further emphasized yoga's effectiveness in managing lymphedema, enhancing mobility, and improving life quality in breast cancer survivors.<sup>34</sup> Rao et al. highlighted yoga's positive effects on mood, stress reduction, and overall quality of life in cancer patients.<sup>35</sup> Yoga, as a complementary therapy, has shown potential in alleviating CINV. While the exact processes by which yoga could alleviate CINV is uncertain, the possible mechanisms by which Yoga could exert beneficial effects in CINV include stress reduction, promoting parasympathetic activity, emphasising the mind body connection, reducing inflammation and promoting immune modulation, and improving psychological resilience by promoting mindfulness, emotional regulation, and coping strategies.

### Objective

Here we aim to explore the existing literature and provide insights into how yoga practices can positively impact the incidence and the management of CINV. We felt such a review would provide valuable insights in how yoga could serve as a complementary no pharmacological intervention in improving CINV.

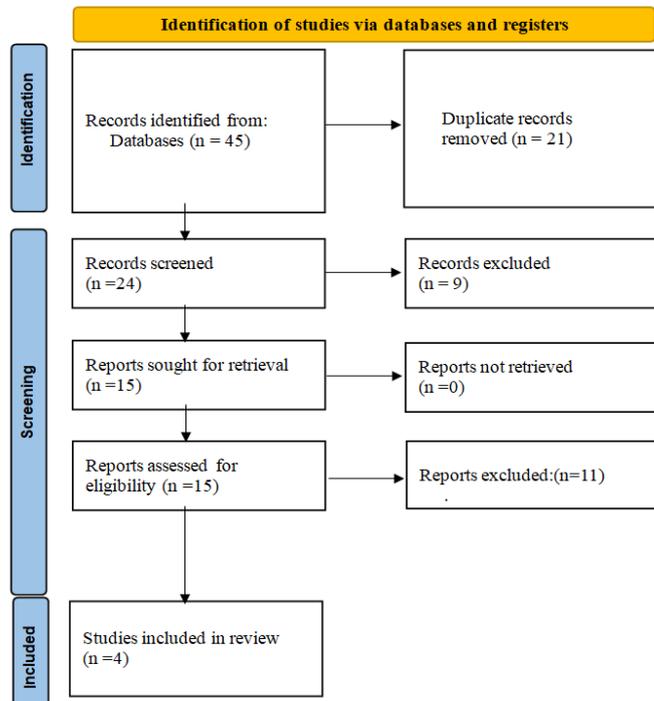
### METHODS

This review was conducted by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Search Strategy for Literature: A comprehensive, multi-step search was undertaken in several databases, including PubMed, Web of Science, Amed, Embase, Emcare, Cochrane Library, and Cinahl. The search strategy employed keywords such as "Yoga," "CINV," "Vomiting," "Nausea," and "QOL." We focused on human studies published in English from 2003 to 2023. Excluded from the search were conference proceedings, editorials, commentaries, case reports, qualitative studies, and book-related literature. Initially, the results from all databases were compiled, and duplicates were removed. The remaining studies underwent a thorough screening process involving a review of titles, abstracts, and full texts to ensure compliance with our inclusion criteria. Criteria for Inclusion and Exclusion, and Data Analysis: Studies were selected based on the following inclusion criteria: (a) randomized controlled clinical trials involving human participants, (b) interventions using "Yoga" compared against a non-yoga control group, and (c) assessment of health-related outcomes using clinical measures. Language and publication type restrictions were applied, limiting the selection to studies published in English involving human subjects. (a) Data extracted from the selected studies included: Study details like first author, publication year, and country, (b) Methodological aspects include sample size and age range in intervention and control groups, (c) Study design specifics like randomization methods and study duration, (d) Detailed description of the intervention and control conditions, particularly the type, frequency, and duration of yoga practices, (e) Outcome measures focusing on clinical parameters.

### RESULTS

Following an initial search across multiple databases, including PubMed, Web of Science, Amed, Embase, Emcare, Cochrane

Library, and Cinahl, a total of 45 potentially relevant publications were identified. After eliminating duplicates, 24 publications remained. A subsequent screening process based on titles and abstracts, by our specific inclusion criteria, further refined the selection to 15 studies. Following a thorough review of the full text of these 15 articles, only four studies met all the requirements for inclusion in our final review [Figure 1]. Here we present a detailed analysis of these four selected studies and summarize their key findings in Table 1.



**Figure 1. Summarised search strategy (Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram)**

The randomised study conducted by Raghavendra et al. aimed to investigate the impact of an integrated yoga program on chemotherapy-induced nausea and vomiting (CINV) in early-stage breast cancer patients.<sup>36</sup> In total, 62 participants were randomly assigned to receive either yoga intervention (n = 28) or supportive therapy (n = 34) during their chemotherapy treatment. Both groups shared similar sociodemographic and medical characteristics. The yoga program consisted of a combination of asanas, breathing exercises, pranayama, meditation, and yogic relaxation, customised to alleviate the side effects of chemotherapy. An instructor led the program and the participants engaged in a 30-minute session before their chemotherapy infusion. They were also encouraged to practice the techniques at home for an hour daily, guided by audiotapes. The intervention aimed to utilise yoga's calming and focusing principles to help manage the stress of chemotherapy, supplemented by individual counselling sessions to support and motivate the patients in their practice. The study's primary outcome measure was the Morrow Assessment of Nausea and Emesis (MANE), which was assessed after the fourth cycle of chemotherapy. Secondary outcomes included measures for anxiety, depression, quality of life, distressful symptoms, and treatment-related toxicity, evaluated before and during chemotherapy. The results of the study indicated that the yoga intervention was effective in reducing chemotherapy-related symptoms in stage II and III breast cancer patients. The yoga group exhibited a significant reduction in the frequency and intensity of post-chemotherapy nausea (18% reduction) and anticipatory nausea (12% to 18%

reduction), as well as a 9% reduction in the intensity of anticipatory vomiting, compared to the control group receiving supportive therapy and coping preparation. Although there was a trend towards a reduction in post-chemotherapy vomiting in the yoga group, this was not statistically significant. The frequency and intensity of post-chemotherapy vomiting saw a 13% and 10% reduction, respectively, and a 2% reduction in the frequency of anticipatory vomiting. However, these changes did not reach a level of statistical significance. The study also revealed that the yoga intervention's effects were more pronounced when anxiolytic medications were not used, indicating that the use of anxiolytics in the control group may have masked the full impact of the yoga intervention. In this subset, the yoga intervention led to a 39% reduction in nausea intensity, 21.8% reduction in nausea frequency, 33.65% reduction in vomiting frequency, 39.9% reduction in vomiting intensity, 63.2% reduction in anticipatory nausea intensity, and 83% reduction in anticipatory vomiting intensity. These findings suggest that yoga itself may have significant anxiolytic effects, particularly in patients not taking any anxiolytic medication. Kothari et al. conducted a randomised clinical trial to explore the effectiveness of yoga as a complementary therapy for managing chemotherapy-induced nausea and vomiting (CINV) in cancer patients.<sup>37</sup> The research involved two groups of patients undergoing highly emetogenic chemotherapy, with 50 patients in each group. The experimental group received both yoga and standard antiemetic therapy, while the control group received only the latter.

In the experimental group, patients were instructed to practice yoga and pranayama starting two days before their chemotherapy and to continue throughout their treatment cycle. The practice included seated and lying poses, such as Siddhasana, Padmasana, and Adho Mukha Shavasana, as well as guided meditation. The patients were also given standard antiemetic agents and instructed to continue yoga at home between chemotherapy cycles. The assessment focused on both acute and delayed onset of CINV, using the Radiation Therapy Oncology Group grading system, and the Functional Assessment of Cancer Therapy-General questionnaire was used to evaluate the patient's quality of life. The median age of patients was 51 years, with a male-to-female ratio of 2:1. 38% of patients had an Eastern Cooperative Oncology Group (ECOG) performance status of 0/1, while 62% had an ECOG status of 2. The results showed that the yoga group had a significant reduction in vomiting compared to the control group, while there was an insignificant reduction in chemotherapy-induced nausea. The yoga group also exhibited a significant reduction in Grade 2 and 3 nausea and vomiting. Furthermore, the quality of life of patients with an ECOG 2 performance status significantly improved in the yoga group. The study concluded that integrating yoga into the treatment regimen for cancer patients receiving highly emetogenic chemotherapy, alongside standard antiemetic medication, can be beneficial. The findings suggest that yoga could be a valuable complementary therapy in managing CINV, particularly in improving vomiting control and overall quality of life. In a randomised clinical trial conducted by Rezaei et al., the efficacy of yoga as a complementary therapy for managing chemotherapy-induced nausea and vomiting (CINV) among 60 cancer patients was explored.<sup>38</sup> The participants were selected based on specific criteria, including age, gender, chemotherapy regimen, and history of vomiting, and were randomly assigned to either an intervention or control group.

**Table 1. Summary of Studies that combined Yoga and CINV**

Author and year of publication	Sample size	Study aim	Methods and patient selection	Conclusion
Raghavendra et al.2007 [36]	62 (Yoga n=28, Control n=34)	Investigate impact of yoga on CINV in early-stage breast cancer patients	Randomized to yoga or supportive therapy; 30-min session before chemotherapy, daily practice with audiotapes.	Yoga reduced frequency and intensity of post-chemotherapy nausea and anticipatory nausea/vomiting, especially without anxiolytics.
Kothari et al.2019. [37]	100 (Yoga n=50, Control n=50)	Explore effectiveness of yoga on CINV in patients undergoing highly emetogenic chemotherapy	Randomized to yoga with standard antiemetic therapy or antiemetic therapy alone; yoga practice started two days before chemotherapy.	Yoga reduced vomiting and improved quality of life, especially for patients with ECOG 2 performance status.
Rezaei et al. 2017. [38]	60 (Intervention n=30, Control n=30)	Efficacy of yoga as complementary therapy for CINV	Randomized to intervention or control; yoga exercises before chemotherapy sessions.	Significant reduction in nausea severity after first and second yoga trials; improvement in vomiting by the fourth day.
Anestin et al.2017. [39]	82 (Yoga n=52, SOC n=30)	Impact of specialized yoga program on CINV in breast cancer patients	Randomized to Bali yoga program or SOC; 8-week course with 90-min weekly sessions.	No significant reduction in CINV with the Bali yoga program compared to control after eight weeks.

The study employed rigorous inclusion and exclusion criteria, which ensured a homogeneous sample and excluded patients with conditions such as gastrointestinal tract metastasis or brain tumours and those using other complementary medicines for CINV. Before the first course of chemotherapy, demographic data, nausea severity, and vomiting frequency were recorded. The interval between chemotherapy courses was three weeks; each course lasted four days and was conducted on an outpatient basis. The intervention group engaged in yoga exercises, including Asana, Pranayama, and relaxation, half an hour before the chemotherapy sessions. The patients first participated in complete breathing exercises while in the Sukhasana pose for 5 to 10 minutes, followed by asanas and then focused breathing in Shavasana before chemotherapy. Additionally, the intervention group received follow-up phone calls three times a week and occasional face-to-face visits to ensure adherence. The control group did not participate in the yoga exercises. The study's findings revealed no significant difference in nausea severity between the two groups in the days following chemotherapy initially. However, a significant difference emerged after the first and second yoga trials, indicating a notable reduction in nausea severity in the intervention group. Interestingly, while there was no significant difference in the severity of vomiting between the two groups initially, a significant improvement was observed in the intervention group by the fourth day of the second yoga session. Anestin et al. conducted a randomised controlled trial (RCT) to investigate the impact of a specialised yoga program on breast cancer patients undergoing chemotherapy.<sup>39</sup> The study aimed to recruit women over 18 years old diagnosed with breast cancer (stages I-III) who were not regular yoga practitioners, had no psychiatric diagnoses, and no heart failure. Eligible participants were randomly assigned to either a treatment or a waitlist control group. Out of 82 patients recruited, 52 were randomly assigned to the yoga group, and 30 were assigned to the standard of care (SOC) group. The Bali yoga program, a specialised 8-week course with 90-minute weekly group sessions, was chosen as the intervention. The program was led by experienced instructors and combined Hatha yoga poses, relaxation, breathing techniques, meditation, and visualisation. Each session included an introductory theme, guided relaxation, gentle yoga poses with breathing techniques, and meditation, culminating in a final relaxation period. Participants were also provided DVDs for home practice, starting with 20-minute sessions for the first four weeks and escalating to 40-minute sessions for the remaining period. The yoga poses were gentle and accommodated the physical condition of the participants, with seated supine or all four positions and alternative poses available as needed.

The study results showed that the specialised Bali yoga program did not significantly reduce chemotherapy-induced nausea and vomiting (CINV) in breast cancer patients compared to the control group after eight weeks. The outcome suggests that in this specific context, yoga did not provide a measurable benefit in managing these particular adverse symptoms of chemotherapy. In conclusion, the study demonstrates the potential of yoga as a complementary therapy in reducing chemotherapy-related and anticipatory nausea and vomiting in breast cancer patients, particularly in the absence of anxiolytic medication. However, the specialised Bali yoga program did not produce significant results in this study. Further research is required to evaluate the effectiveness of yoga in managing adverse symptoms of chemotherapy in breast cancer patients.

## DISCUSSION

The studies reviewed in this paper provide valuable insights into the potential benefits of yoga as a complementary therapy for managing chemotherapy-induced nausea and vomiting (CINV). Raghavendra et al.'s study highlights the potential of yoga in reducing both the frequency and intensity of post-chemotherapy nausea, particularly in the absence of anxiolytic medication. This suggests that yoga might possess inherent anxiolytic properties that could prove beneficial in managing CINV, especially in patients not on anxiolytic medications. Kothari et al.'s findings imply that combining yoga with standard antiemetic therapy may help cancer patients enhance control over vomiting and improve their quality of life, particularly those with a performance status of ECOG 2. However, the reduction in nausea was insignificant, indicating the need for further investigation into the specific aspects of yoga that contribute to these benefits. Rezaei et al.'s study demonstrated significant improvements in nausea severity following yoga intervention, although this effect emerged gradually and was more pronounced after multiple sessions. This suggests that a cumulative benefit of yoga practice exists, thus highlighting the importance of consistent participation. On the other hand, Anestin et al.'s study presents a contrasting perspective, as their findings did not show a significant reduction in CINV in breast cancer patients through the specialised Bali yoga program. This indicates that the effectiveness of yoga may vary depending on the type of yoga program, the patient population, and the specific chemotherapy regimen. Overall, the combined evidence from the studies indicates that incorporating yoga may be a beneficial adjunct in the treatment of CINV, with potential benefits in vomiting control, nausea reduction, and overall quality of life.

improvement. However, the variations in outcomes across different studies point to the need for more nuanced research to understand the conditions under which yoga is most beneficial, the optimal types of yoga interventions, and the patient groups most likely to benefit. Additionally, integrating yoga into clinical practice requires careful consideration of patient preferences, physical abilities, and the logistics of incorporating such therapies into standard cancer care protocols.<sup>40</sup> Future studies should focus on identifying the specific yoga practices most effective for CINV and determining the optimal frequency and duration of sessions. Research should also aim to understand the mechanisms through which yoga exerts its effects, whether through stress reduction, enhanced parasympathetic activity, or other physiological or psychological pathways. Additionally, large-scale randomised controlled trials with diverse patient populations are needed to generalise the findings. Finally, exploring the integration of yoga into standard cancer care, considering logistical, cultural, and individual patient factors, will be crucial for practical application.

## Conclusion

The reviewed studies demonstrate the potential of yoga as a complementary therapy for managing chemotherapy-induced nausea and vomiting (CINV). While the outcomes of the studies vary, evidence suggests that yoga can significantly reduce vomiting and improve quality of life, especially when combined with standard antiemetic therapy. Furthermore, consistent yoga practice can gradually improve nausea severity, indicating its cumulative benefit. However, the effectiveness of yoga may depend on the type of yoga, patient population, and chemotherapy regimen being used. The potential anxiolytic effects of yoga, particularly in patients not on anxiolytic medications, warrant further exploration.

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## REFERENCES

1. Azubuike S, Muirhead C, Hayes L, McNally R. Rising global burden of breast cancer: the case of sub-saharan africa (with emphasis on nigeria) and implications for regional development: a review. *World Journal of Surgical Oncology*. 2018;16(1). <https://doi.org/10.1186/s12957-018-1345-2>
2. Shanmugalingam T, Soultati A, Chowdhury S, Rudman S, Hemelrijck M. Global incidence and outcome of testicular cancer. *Clinical Epidemiology*. 2013;417. <https://doi.org/10.2147/cep.s34430>
3. McIntyre A, Ganti A. Lung cancer—a global perspective. *Journal of Surgical Oncology*. 2017;115(5):550-4. <https://doi.org/10.1002/jso.24532>
4. Balakrishnan M, George R, Sharma A, Graham D. Changing trends in stomach cancer throughout the world. *Current Gastroenterology Reports*. 2017;19(8). <https://doi.org/10.1007/s11894-017-0575-8>
5. Dubey A, Gupta U, Jain S. Epidemiology of lung cancer and approaches for its prediction: a systematic review and analysis. *Chinese Journal of Cancer*. 2016;35(1). <https://doi.org/10.1186/s40880-016-0135-x>

6. Porter P. Global trends in breast cancer incidence and mortality. *Salud Pública De México*. 2009;51:s141-s146. <https://doi.org/10.1590/s0036-36342009000800003>
7. Ballatori E, Roila F. Health and Quality of Life Outcomes. 2003;1(1):46. <https://doi.org/10.1186/1477-7525-1-46>
8. Chawla S, Grunberg S, Gralla R, Hesketh P, Rittenberg C, Elmer M, et al. Establishing the dose of the oral nkl antagonist aprepitant for the prevention of chemotherapy-induced nausea and vomiting. *Cancer*. 2003;97(9):2290-300. <https://doi.org/10.1002/cncr.11320>
9. Eisenberg P, Figueroa-Vadillo J, Zamora R, Charu V, Hajdenberg J, Cartmell A, et al. Improved prevention of moderately emetogenic chemotherapy-induced nausea and vomiting with palonosetron, a pharmacologically novel 5-HT<sub>3</sub> receptor antagonist. *Cancer*. 2003;98(11):2473-82. <https://doi.org/10.1002/cncr.11817>
10. Grunberg S, Dugan M, Muss H, Wood M, Burdette-Radoux S, Weisberg T, et al. Effectiveness of a single-day three-drug regimen of dexamethasone, palonosetron, and aprepitant for the prevention of acute and delayed nausea and vomiting caused by moderately emetogenic chemotherapy. *Supportive Care in Cancer*. 2008;17(5):589-94. <https://doi.org/10.1007/s00520-008-0535-9>
11. Barbour S. Corticosteroids in the treatment of chemotherapy-induced nausea and vomiting. *Journal of the National Comprehensive Cancer Network*. 2012;10(4):493-9. <https://doi.org/10.6004/jnccn.2012.0049>
12. Sheikhi M, Ebadi A, Talaeizadeh A, Rahmani H. Alternative methods to treat nausea and vomiting from cancer chemotherapy. *Chemotherapy Research and Practice*. 2015;2015:1-6. <https://doi.org/10.1155/2015/818759>
13. Molassiotis A, Yung H, Yam B, Chan F, Mok T. The effectiveness of progressive muscle relaxation training in managing chemotherapy-induced nausea and vomiting in Chinese breast cancer patients: a randomised controlled trial. *Supportive Care in Cancer*. 2002;10(3):237-46. <https://doi.org/10.1007/s00520-001-0329-9>
14. Kaiser R, Sezer O, Papias A, Bauer S, Schelenz C, Tremblay P, et al. Patient-tailored antiemetic treatment with 5-hydroxytryptamine type 3 receptor antagonists according to cytochrome p-450 2d6 genotypes. *Journal of Clinical Oncology*. 2002;20(12):2805-11. Available from: <https://doi.org/10.1200/jco.2002.09.064>
15. Qi L, Luo Q, Zhang Y, Jia F, Zhao Y, Wang F. Advances in toxicological research of the anticancer drug cisplatin. *Chemical Research in Toxicology*. 2019;32(8):1469-86. Available from: <https://doi.org/10.1021/acs.chemrestox.9b00204>
16. Kamen C, Tejani M, Chandwani K, Janelins M, Peoples A, Roscoe J, et al. Anticipatory nausea and vomiting due to chemotherapy. *European Journal of Pharmacology*. 2014;722:172-9. Available from: <https://doi.org/10.1016/j.ejphar.2013.09.071>
17. Hamada S, Hinotsu S, Kawai K, Yamada S, Narita S, Kamba T, et al. Antiemetic efficacy and safety of a combination of palonosetron, aprepitant, and dexamethasone in patients with testicular germ cell tumor receiving 5-day cisplatin-based combination chemotherapy. *Supportive Care in Cancer*. 2014; 22(8):2161-6. Available from: <https://doi.org/10.1007/s00520-014-2182-7>
18. Schnell F. Chemotherapy-induced nausea and vomiting: the importance of acute antiemetic control. *The Oncologist*. 2003;8(2):187-98. Available from: <https://doi.org/10.1634/theoncologist.8-2-187>

19. Singh K, Dhruva A, Flowers E, Kober K, Miaskowski C. A review of the literature on the relationships between genetic polymorphisms and chemotherapy-induced nausea and vomiting. *Critical Reviews in Oncology/Hematology*. 2018;121:51-61. Available from: <https://doi.org/10.1016/j.critrevonc.2017.11.012>
20. Sugino S, Janicki P. Pharmacogenetics of chemotherapy-induced nausea and vomiting. *Pharmacogenomics*. 2015;16(2):149-60. Available from: <https://doi.org/10.2217/pgs.14.168>
21. Lorusso V, Russo A, Giotta F, Codega P. Management of chemotherapy-induced nausea and vomiting (CINV): a short review on the role of netupitant-palonosetron (NEPA). *Core Evidence*. 2020;15:21-29. Available from: <https://doi.org/10.2147/ce.s203634>
22. Massaro A, Lenz K. Aprepitant: a novel antiemetic for chemotherapy-induced nausea and vomiting. *Annals of Pharmacotherapy*. 2005;39(1):77-85. Available from: <https://doi.org/10.1345/aph.1e242>
23. Bosnjak S, Gralla R, Schwartzberg L. Prevention of chemotherapy-induced nausea: the role of neurokinin-1 (NK1) receptor antagonists. *Supportive Care in Cancer*. 2017;25(5):1661-71. Available from: <https://doi.org/10.1007/s00520-017-3585-z>
24. Andrykowski, M. (1990). The role of anxiety in the development of anticipatory nausea in cancer chemotherapy: a review and synthesis. *Psychosomatic Medicine*, 52(4), 458-475. <https://doi.org/10.1097/00006842-199007000-00008>
25. Dupuis L, Nathan P. Options for the prevention and management of acute chemotherapy-induced nausea and vomiting in children. *Pediatric Drugs*. 2003;5(9):597-613. Available from: <https://doi.org/10.2165/00148581-200305090-00003>
26. Marchioro G, Azzarello G, Viviani F, Barbato F, Pavanetto M, Rosetti F, et al. Hypnosis in the treatment of anticipatory nausea and vomiting in patients receiving cancer chemotherapy. *Oncology*. 2000;59(2):100-104. Available from: <https://doi.org/10.1159/000012144>
27. Morrow G, Roscoe J, Hynes H, Flynn P, Pierce H, Burish T. Progress in reducing anticipatory nausea and vomiting: a study of community practice. *Supportive Care in Cancer*. 1997;6(1):46-50. Available from: <https://doi.org/10.1007/s005200050131>
28. Garcia M, McQuade J, Haddad R, Patel S, Lee R, Yang P, et al. Systematic review of acupuncture in cancer care: a synthesis of the evidence. *Journal of Clinical Oncology*. 2013;31(7):952-60. Available from: <https://doi.org/10.1200/jco.2012.43.5818>
29. Richardson J, Smith J, McCall G, Richardson A, Pilkington K, Kirsch I. Hypnosis for nausea and vomiting in cancer chemotherapy: a systematic review of the research evidence. *European Journal of Cancer Care*. 2007;16(5):402-12. Available from: <https://doi.org/10.1111/j.1365-2354.2006.00736.x>
30. Shen J, Wenger N, Glaspy J, Hays R, Albert P, Choi C, et al. Electroacupuncture for control of myeloablative chemotherapy-induced emesis. *Jama*. 2000;284(21):2755. Available from: <https://doi.org/10.1001/jama.284.21.2755>
31. Marx W, Kiss N, McCarthy A, McKavanagh D, Isenring E. Chemotherapy-induced nausea and vomiting: a narrative review to inform dietetics practice. *Journal of the Academy of Nutrition and Dietetics*. 2016;116(5):819-27. Available from: <https://doi.org/10.1016/j.jand.2015.10.020>
32. Cramer H, Lange S, Klose P, Paul A, Dobos G. Yoga for breast cancer patients and survivors: a systematic review and meta-analysis. *BMC Cancer*. 2012;12(1). Available from: <https://doi.org/10.1186/1471-2407-12-412>
33. Buffart L, Uffelen J, Riphagen I, Brug J, Mechelen W, Brown W, 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(1). Available from: <https://doi.org/10.1186/1471-2407-12-559>
34. Saraswathi V, Latha S, Niraimathi K, Elangovan V. Managing lymphedema, increasing range of motion, and quality of life through yoga therapy among breast cancer survivors: a systematic review. *Int J Yoga*. 2021;14(1):3. Available from: [https://doi.org/10.4103/ijoy.ijoy\\_73\\_19](https://doi.org/10.4103/ijoy.ijoy_73_19)
35. Rao R, Ram A, Vinutha H, Vaishnaruby S, Deepashree S, Megha M, et al. Role of yoga in cancer patients: expectations, benefits, and risks: a review. *Indian J Palliat Care*. 2017;23(3):225. Available from: [https://doi.org/10.4103/ijpc.ijpc\\_107\\_17](https://doi.org/10.4103/ijpc.ijpc_107_17)
36. Raghavendra RM, Nagarathna R, Nagendra H, Gopinath K, Srinath BS, Ravi B, et al. Effects of an integrated yoga programme on chemotherapy-induced nausea and emesis in breast cancer patients. *European Journal of Cancer Care*. 2007;16(6):462-74. Available from: <https://doi.org/10.1111/j.1365-2354.2006.00739.x>
37. Kothari TO, Jakhar SL, Bothra D, Sharma N, Kumar HS, Baradia MR. Prospective randomized trial of standard antiemetic therapy with yoga versus standard antiemetic therapy alone for highly emetogenic chemotherapy-induced nausea and vomiting in South Asian population. *Journal of Cancer Research and Therapeutics*. 2019;15(5):1120-3. Available from: [https://doi.org/10.4103/jcrt.JCRT\\_860\\_16](https://doi.org/10.4103/jcrt.JCRT_860_16)
38. Rezaei KAZH, Asadizaker M, Hoseini SM, Jahani SI, Latifi SM. Effects of yoga on post-chemotherapy nausea and vomiting. *Biomedical and Pharmacology Journal*. 2017;10(2):773-80.
39. Anestin AS, Dupuis G, Lanctôt D, Bali M. The Effects of the Bali Yoga Program for Breast Cancer Patients on Chemotherapy-Induced Nausea and Vomiting: Results of a Partially Randomized and Blinded Controlled Trial. *Journal of Evidence-Based Complementary & Alternative Medicine*. 2017; 22(4):721-30. doi:10.1177/2156587217706617
40. Danhauer S., Addington E., Cohen L., Sohl S., Puymbroeck M., Albinati N. et al.. Yoga for symptom management in oncology: a review of the evidence base and future directions for research. *Cancer* 2019;125(12):1979-1989. <https://doi.org/10.1002/cncr.31979>

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