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## Effect of Pranayama on Migraine

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### Abstract

It is thought that aberrant brain activity that affects blood flow, hormones, and nerve pathways in the brain and surrounding tissues is the first step in migraine attacks. A complex disorder, migraine is influenced by both environmental and hereditary factors. Certain genes have been linked to migraines, and the condition frequently runs in families. Hormonal fluctuations can be a trigger, especially for women going through menstruation or pregnancy. Attacks can be triggered by stress, anxiety, and changes in sleep patterns. Common triggers include bright lights, loud noises, and overpowering scents or perfumes. Other factors may include particular foods, caffeine withdrawal, and missed meals. The main objective of this study was to do a systematic review to examine the effects of pranayama intervention on migraine. Data was collected from PubMed and Web of Science. Randomized controlled trials published in English from the inception of the database until 15<sup>th</sup> October, 2025, were included. Only pranayama as intervention were included in the study. It may be concluded that migraine patients' antioxidant levels, stress, anxiety, sleep quality, and general quality of life can all be significantly improved by pranayama practice.

**Keywords:** Yoga - Pranayama - Migraine

### Introduction

A complex illness, cancer is defined by aberrant cell proliferation that has the capacity to invade or spread to other bodily parts. With a projected 19.3 million new cases and nearly 10 million cancer-related deaths in 2020, according to the World Health Organization, the incidence of cancer is on the rise <sup>[1]</sup>. It is expected that this rising tendency will intensify; estimates indicate that there will be 28.4 million cases by 2040, a 47% increase from 2020. Population growth and aging, together with shifts in the distribution and incidence of important cancer risk factors many of which are linked to socioeconomic development are some of the causes of this concerning increase. Patients may experience severe physical and psychological side effects from the diagnosis and treatment of cancer, including stress, anxiety, and other adverse effects linked to traditional therapy. Supportive care techniques that supplement traditional medical treatments are therefore essential [3,4]. Pranayama and other complementary techniques offer a comprehensive way to lessen some of these pressures. These techniques are essential to the all-encompassing care of cancer patients because they promote relaxation, boost mental health, and improve overall quality of life. Incorporating complementary therapies into cancer treatment helps people to heal while simultaneously addressing the disease's complex effects <sup>[5]</sup>. This emphasizes how important holistic health practices are to contemporary healthcare and how crucial it is to view them as an essential component of cancer treatment. This method can enhance general health and well-being and offer comprehensive patient care. An essential component of yoga, pranayama is one of the age-old Indian techniques that has gained international attention for its health benefits despite its traditional limitations. According to important writings like Patanjali's Yoga Sutras, the idea of pranayama is firmly ingrained in the theoretical and practical foundation of yoga <sup>[6]</sup>. Pranayama was once a way of life that stressed the harmony and interconnectedness of the body, mind, and spirit rather than merely a technique. The Sanskrit terms "Prana," which denotes the essential life force that permeates all living things, and "Yama," which indicates control or extension, are the roots of the phrase "Pranayama." A number of breathing

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techniques are used in this practice to regulate breath depth and rhythm. It is said that by regulating breath, one can affect the body's prana flow, which will increase energy and mental clarity. Among the many methods Pranayama employs is Nadi Shodhana, which seeks to balance the brain's left and right hemispheres in order to promote mental clarity and serenity. The energizing practice of kapalabhati improves lung capacity and stimulates the mind. On the other hand, Bhramari is well-known for its calming properties, which are especially helpful in lowering anxiety and stress. Another method that induces a profound state of meditation is Sudarshan Kriya, which culminates in silence and Om chanting after incorporating Ujjayi breathing and Bhastrika. The methods used in these activities differ; some concentrate on mind-calming, while others invigorate the body or support the processes of detoxification and cleansing. Pranayama has physiological effects on the autonomic nerve system, which regulates automatic body processes including digestion and heartbeat. Frequent practice is thought to enhance the sympathetic-parasympathetic balance, which is essential for preserving mental and physical well-being, especially for stress and anxiety management [8]. Pranayama is frequently commended for its psychological advantages in addition to its physiological effects. This is an effective method for improving emotional stability, focus, and mental clarity [9]. Pranayama practitioners assert that controlling their breathing leads to inner serenity and mindfulness, which can be especially helpful in coping with life's pressures and stressors [10]. Pranayama has a special place in cancer care because of its capacity to enhance quality of life and control side effects associated with treatment. Cancer therapy frequently comes with intimidating physical and mental obstacles. Pranayama, on the other hand, may provide a supportive care strategy that supplements conventional cancer treatments due to its capacity to reduce stress, boost respiratory. Many studies have been conducted on the medicinal advantages of pranayama. Numerous physiological and psychological benefits of pranayama have been identified by these investigations. Pranayama has been demonstrated to promote respiratory and cardiovascular health, raise parasympathetic tone while lowering sympathetic activity, and improve cardiorespiratory fitness [14, 15, 16, 17]. Additionally, Pranayama has been shown to benefit a number of cardiovascular and respiratory disorders, including hypertension, asthma, and chronic obstructive pulmonary disease (COPD) [18]. Given its many psychological advantages, pranayama is a suggested low-risk, low-cost supplement to traditional treatments for substance misuse, stress-related illnesses, and the rehabilitation of criminal offenders [19]. Research has demonstrated that pranayama can enhance general wellbeing, sleep disturbance, and mental quality of life [20, 21]. It may be used as a supplemental treatment for smoking cessation and stress-related disorders like combat stress in military people because it has also been proposed to improve affect and lower stress [22]. Pranayama has been included into full-fledged yoga practices, which include physical postures, meditation, and relaxation techniques, in addition to its physiological and psychological advantages. In addition to decreasing functional impairment, pain, and flexibility in patients with osteoarthritis of the knee joint, this multifactorial approach is useful for controlling illnesses like diabetes, osteoarthritis, and knee arthritis [23, 24]. Pranayama's ability to enhance general well-being has also been highlighted by its association with better biopsychosocial alterations in older persons with lower-extremity osteoarthritis. All things considered, pranayama

represents a comprehensive approach to health, considering the person as an integrated whole. Pranayama provides a tried-and-true, non-invasive method of improving well-being in the context of contemporary healthcare, where there is a growing understanding of the interaction between the mind and body. This method may be especially helpful in the treatment of complicated illnesses like cancer. Although a number of research have been done on the effects of pranayama on cancer patients, no evaluations have been done as of yet.

**Aim of the study:** The purpose of this review was to assess Pranayama's impact on cancer patients. Its impact on symptoms of cancer, adverse effects of treatment, quality of life, mental health, and physical results are the main topics of discussion. Given the difficulties patients encounter with traditional cancer treatments, the growing interest in complementary and alternative medicine (CAM) for cancer care serves as the impetus for this review [25,26]. Pranayama's ability to reduce stress and improve wellbeing has led to its consideration as an additional therapy in the treatment of cancer. In order to shed light on Pranayama's possible function, guide clinical procedures, and support future oncology research, this review aims to investigate the data supporting its efficacy and safety in cancer patients.

**Methods:** A systematic literature search was conducted in PubMed, Web of Science, and J-Store with no data restrictions, up to 10th October, 2025. Yoga training intervention studies along with pranayama were included. In total, data from 1137 participants in 243 and 16 research articles were included for the synthesis of this review regarding measures of various factors of cancer. This methodological approach guarantees a thorough yet adaptable study appropriate for collecting the wide range of information on Pranayama in cancer patient care, albeit not exactly following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses criteria. The review emphasizes the need for more investigation to determine Pranayama's efficacy in cancer treatment, particularly in reducing psychological and physical symptoms and enhancing quality of life. Trials looking into Pranayama's physiological and psychological impacts on cancer patients met the inclusion criteria; non-randomized research, commentaries, and those without main data or pertinent outcomes were not included. In order to illustrate Pranayama's influence on cancer care, the researcher narratively aggregated data on study design, sample size, interventions, and outcomes.

**Result and Discussion:** 347 publications that might be pertinent to our topic were found by our search. 52 publications were left after duplicates and papers that did not fit the inclusion criteria were removed. The selection was further reduced to 36 research after we used particular inclusion criteria to screen these articles based on their titles and abstracts. Twelve publications were picked after a thorough assessment of the complete texts of these 36 investigations and ultimately discovered that just eight of that research satisfied all requirements to be included in our final review. In order to assess the impact of Sudarshan Kriya (SK) and Pranayama (P) on blood cortisol levels and pain perception in women with advanced-stage breast cancer, Kumar *et al.* carried out a randomized controlled experiment [27]. A total of 147 participants were randomized to either the standard care group (n = 69) or the intervention group (n =

78), which received standard treatment in addition to the SK and P therapies. Under the direction of qualified yoga instructors, the intervention comprised a three-day, eighteen-hour program that focused on self-awareness, Ujjayi breath, Bhastrika Pranayama, and rhythmic breathing related to SK. pharmaceutical pain management, with a family member tasked with keeping an eye on their routine. Following the workshop, members in the intervention group were given instructions to use these methods for 20 minutes every day at home in addition to their usual medication regimen for pain management. A family member was tasked with keeping an eye on their daily routine. Following three months of practice, the results revealed that the intervention group's serum cortisol levels were significantly lower than those of the control group, suggesting that those practicing SK and P were less stressed. In particular, the intervention group showed sustained stress reduction over time, as seen by considerably lower cortisol levels at the third and sixth-month visits. With a decrease of three points on the pain scale at the third and sixth-month visits, the intervention group's pain perception also shown noteworthy improvements, indicating that SK and P might successfully reduce pain in patients with advanced-stage breast cancer. A randomized controlled trial (RCT) was carried out in 2013 by Chakrabarty *et al.* to examine the impact of Pranayama on the levels of protein thiols and glutathione in patients with breast cancer after radiation therapy [28]. This study assessed Pranayama's potential to stop the typical decline in antioxidant levels that happens after radiation treatment. A total of 160 patients with breast cancer were randomized to either the experimental group (n = 80) which underwent radiation therapy and Pranayama, or the control group (n = 80) that received only radiation therapy with routine care. Over the course of six weeks, participants in the Pranayama intervention practiced three distinct techniques: Brahmari, Sheethali, and Nadi Sodhana, for about eighteen minutes each morning and evening. Both groups had blood drawn at the start and finish of the six-week course of therapy. Prior to RT, there was no discernible change in the two groups' protein thiol levels, according to the study results. Nevertheless, a notable rise in protein thiol levels was noted in the experimental group relative to the control group following the conclusion of radiation therapy. This implies that Pranayama might support or strengthen the antioxidant defence system in radiation-treated breast cancer patients. Additionally, the experimental group's mean glutathione levels were greater than those of the control group, suggesting that Pranayama practitioners may be less susceptible to oxidative stress. These findings imply that pranayama may strengthen the body's antioxidant defences, thereby protecting against oxidative stress brought on by radiation therapy. Two years later, the same team of investigators reported another outcome measure of cancer-related fatigue in the same patient sample [29]. The Cancer weariness Scale, which assesses weariness in the functional, affective, cognitive, and physical domains, was employed. No fatigue, mild fatigue, moderate fatigue, and severe fatigue are the four categories into which the scale divides fatigue severity. Both the experimental (76.25%) and control (87.5%) groups' majority of individuals initially reported just mild weariness. Severe weariness was reported by a minor percentage of patients in both groups (control group: 8.75 percent, experimental group: 11.25%). The data showed a substantial difference in the two groups' levels of cancer-related fatigue after radiation therapy was finished. Compared to patients in the experimental group who practiced Pranayama, patients in the control group—who just

received radiation therapy had more severe fatigue complaints. Another outcome measure of emotional characteristics, including impatience, fear, anxiety, and annoyance, was reported by the same group in 2016 [30]. A scale of five items, each evaluated on an 11-point scale (0–10, with 0 denoting the least negative emotion), is used to examine emotional characteristics, which is a crucial component of assessing cancer-related fatigue. The items particularly assessed the patients' levels of fatigue, impatience, worry, anxiety, and annoyance. Through an expert evaluation, the scale's content validity was guaranteed. Surveys of the patients were conducted both at the start of their radiation therapy and six weeks after it was finished. The results showed a substantial difference in the two groups' emotional well-being at the end of the treatment period, with concern being the most often reported negative feeling and emotional discomfort being common among the patients. Pranayama practitioners in the experimental group had lower mean ratings for negative emotions and reported far lower levels of worry, anxiety, and annoyance than patients in the control group. It's interesting that the study found no discernible change in the control group's emotional scores, indicating that the emotional discomfort brought on by cancer therapy may not be lessened in the absence of an intervention like Pranayama. The usefulness of yoga breathing techniques and a problem-solving approach in enhancing perioperative outcomes in people with lung cancer having surgical resection was examined by Lu *et al.* in a randomized controlled experiment [31]. This study proposed yoga breathing exercises as a feasible approach for pulmonary rehabilitation to improve patients' recovery and well-being in order to meet the substantial load that lung cancer and its surgical treatment place on patients. 108 patients with lung cancer were recruited for the study and randomly assigned to one of three groups: one group received yoga breathing exercises that were based on a problem-solving approach, another group received yoga breathing exercises alone, and the third group received standard care. In addition to patient compliance, the main outcome measures were dyspnea, exercise capacity, anxiety, depression, and the duration of the thoracic drainage tube's postoperative indwelling. after the time of admission, the day before surgery, and after discharge, these results were assessed. According to the findings, patients in the group who received the problem-solving model and yoga breathing techniques together saw noticeably bigger improvements in their anxiety, exercise capacity, and dyspnea than patients in the control group. In particular, patients' anxiety and dyspnea were considerably reduced by yoga breathing techniques alone. A significant difference in exercise capacity and compliance between the two intervention groups was found, favouring the combination of the problem-solving paradigm and yoga breathing. Regarding the thoracic drainage tube's indwelling time and depression, the study did not discover any appreciable variations between the three groups. The efficacy of Pranayama in lowering fatigue in cancer patients receiving External Radiation Therapy (ERT) was investigated in the Kaur *et al.* experiment [32]. 84 cancer patients made up the sample; they were divided equally into two groups, 42 in each, and allocated at random to either the experimental or control groups. Fatigue levels were assessed using Toru Okuyama's Cancer Fatigue Scale (CFS). Over the course of 12 days, the experimental group was given a Pranayama intervention that included 40 minutes a day of different breathing techniques, such as Sahaj Pranayama, Nadi Sodhana, Sheethali, Brahmari, Ujjayi, Chandrabhedhi,

Suryabhedhi, and Bhastrika. The results of the study showed that after the intervention, the experimental group members' levels of fatigue had significantly decreased. In particular, 64.3% of individuals in the control group reported experiencing severe weariness, compared to 97.6% of people in the experimental group who reported mild fatigue. The effectiveness of Pranayama in lowering fatigue in ERT recipients was demonstrated by the statistical analysis, which showed a significant mean difference in fatigue levels between the two groups after the intervention ( $t=17.99$ ,  $df=41$ ,  $p\text{-value}<.001$ ). The efficacy of Pranayama and mindfulness meditation in reducing emotional distress and exhaustion in adult haematological cancer patients after chemotherapy was investigated by Joshi *et al.* [33]. 27 adult patients were randomly assigned to either the intervention group ( $n = 12$ ) or the control group ( $n = 15$ ) for this study. Over the course of six weeks, the intervention group participated in daily sessions consisting of 15 minutes of mindfulness meditation and 15 minutes of slow-paced Pranayama. The Emotional Thermometer (ET) for emotional distress and the exhaustion Assessment Scale (FAS) for exhaustion were used to assess the efficacy of the therapies. Both before and after the 6-week intervention period, assessments were carried out. Important results from seven randomized controlled trials that examined Pranayama's impact on cancer patients are highlighted in this overview of the literature. The compiled data from the evaluated studies shows that pranayama offers cancer patients a variety of advantages, including enhancements in the psychological and physiological realms. Patients who practice Sudarshan Kriya and Pranayama in addition to their regular medical care report consistently lower stress levels, as indicated by lower serum cortisol levels. The potential of pranayama to strengthen the body's resistance to the psychological impacts of cancer diagnosis and treatment is highlighted by this decrease in stress biomarkers [27]. Additionally, intervention groups showed significant improvements in antioxidant levels and pain perception, particularly in radiation-treated breast cancer patients. Pranayama may provide protection that enhances traditional treatment methods by preventing the oxidative damage commonly linked to radiation therapy [28]. Additionally, patients who practice pranayama report significant reductions in the intensity of their emotional distress and exhaustion, as well as in negative emotions like worry, anxiety, and irritation. These results show that Pranayama helps manage the common adverse effects of cancer and its treatments, and they are consistent across several research [29, 30]. From Nadi Sodhana to Bhastrika, the numerous Pranayama techniques used in the studies show how adaptable this practice is in meeting a range of therapeutic demands. The persistent observation of beneficial benefits, despite the variety of approaches and end measures, points to Pranayama's universal therapeutic potential, which merits more research. The health advantages of pranayama have been studied in the past for a variety of medical ailments. But our evaluation of the literature only looks at how Pranayama practices affect cancer patients, which is a specific subfield of Pranayama research. In line with our findings, Jayawardena *et al.* have emphasized the advantages of pranayama in enhancing the physiological processes and quality of life in cancer patients [34]. In their discussion of Bhramari Pranayama's effects, Kuppusamy *et al.* highlighted the parasympathetic predominance that may contribute to its possible health advantages [35]. However, because of methodological flaws in previous research, their review pointed to the necessity of

high-quality randomized trials. By concentrating only on randomized controlled trials, our review, on the other hand, has advanced the field and ensured a stronger body of evidence supporting Pranayama's benefits in cancer treatment. In their narrative review of yogic breath management, Saoji *et al.* offered proof of its positive impacts in clinical and physiological contexts, encompassing both communicable and non-communicable disorders [36]. This analysis, however, offers a more thorough examination of Pranayama's approach to treating cancer-related symptoms and adverse treatment effects. By concentrating only on randomized controlled trials, our review has advanced the field and ensured a stronger body of evidence supporting Pranayama's benefits in cancer treatment. Furthermore, by providing thorough evidence of Pranayama's involvement in managing cancer-specific outcomes like symptom relief, stress reduction, and general quality of life improvement, this review enhances this wide viewpoint. Future studies should strive for larger, multi-centre trials with standardized Pranayama procedures to guarantee consistency and comparability in order to overcome these limitations and deepen our understanding of Pranayama's function in cancer care. [7] A more thorough evaluation of Pranayama's benefits would be possible by including objective measurements in addition to self-reported results, which would keep the reader informed of the need for additional study. Insights regarding the significance of Pranayama practice in continuing cancer care and survivorship could be gained by investigating its long-term effects and sustainability beyond the intervention. Furthermore, examining the processes that underlie the advantages of pranayama may clarify how these techniques produce their therapeutic benefits, maybe resulting in more focused and efficient therapies. Future research ought to examine the potential synergistic effects of combining Pranayama with other therapy modalities, like mindfulness and problem-solving techniques, in order to maximize outcomes for cancer patients.

## Conclusions

In summary, Pranayama shows promise as a supplemental therapy that may greatly improve the health and quality of life of cancer patients. Nevertheless, there are obstacles to its use, such as possible biases resulting from the difficulty of blinding studies and variations in practitioner delivery. While the limited diversity in study populations and locations may impact the generalizability of results, the use of self-reported outcomes also runs the risk of creating biases. It is essential to conduct thorough research using more exacting methodologies, objective and standardized outcome measurements, and a wider variety of cancer populations in order to include Pranayama into traditional oncology and strengthen its body of evidence. This strategy will enable a comprehensive, patient-centred cancer care model and prove Pranayama's efficacy. It is evident that more thorough and methodologically sound study is required to determine Pranayama's final function in cancer treatment.

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