



An Integrated Approach of Yoga and Ayurveda in Cancer Rehabilitation: A Systematic Review

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Authors' contributions

This work was carried out in collaboration among all authors. Author SD designed the study, performed the literature searches and wrote first draft of manuscript. Authors GD and SL guided the first author in preparing the conceptual model. All authors read and approved the final manuscript.

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ABSTRACT

Aims: In this comprehensive evaluation of literature, body-mind practices of Yoga and Ayurveda during cancer rehabilitation are summarized.

Methodology: Through a methodical searching of PubMed, Embase, Scopus, Web of Science, and Allied Health Plus with a timescale of January 2007 to April 2021, appropriate research papers were identified. Data about study design, method of recruiting, subjects, interventions, and findings were taken out. Retrospective data analysis, pilot or feasibility studies were eliminated, whereas preliminary, controlled studies involving one- and multiple equipped samples, examining rehabilitating therapies for cancer patients at any phase with in-care spectrum had been included.

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Results: The study included fifteen papers as outcome of PRISM model, wherein, breast carcinoma cases are predominant. Majority of therapies involved herbal and yoga-based regimens that enhanced psycho-physiological indicators and quality of life.

Conclusion: Preliminary research suggests that integrating Yoga and Ayurveda remedies with lifestyle-relied intervention is possible to improve self-healing capacity and sustainability in cancer patients, however methodical constraints of investigations in this growing field should be addressed. To progress the discipline, new research with robust research approaches seems to be necessary.

Keywords: Cancer; yoga; Ayurveda; rehabilitation; body-mind therapy.

1. INTRODUCTION

The most common cause of morbidities across entire globe is carcinoma, often known as malignancy in various tumours. It is recognized as the second leading cause of mortality, in which, 70percent of deaths occur in underdeveloped and developing nations involving 25percent of hepatitis and human papillomavirus infection cases respectively as risk variables [1]. Lack of physical activity, overweight, a minimal intake of plant - based foods, overuse of tobacco, and alcoholic are the key variables that influence the development of carcinoma [2,3]. Among these, smoking alone accounts for 22percent of deaths. Abnormal cell proliferation in addition to their capacity of expanding outside of initial position are the two key features which can cause mortality if the disease development is not halted. The presence of malignant cells as well as their invasion to surrounding healthy tissue is a contributing factor in the concern. Although some of these tumours could be relatively easily confined and sequestered, others are quite invading, that have progressed to many different regions of body, rendering the process of elimination very challenging. In essence, the purpose of anticancer therapy is to minimize or, preferably, eradicate all cancerous cells from the body. This is frequently simple than it sounds, though. Physicians, researchers, and medical associations are making numerous attempts to manage the illness, yet cancer remains continues to spread. Surgical, chemotherapeutic, and radiation are the 3 primary therapy modalities that have developed over time. The bulk of people who have malignancy and survive tend to have affected either by physical or cognitive abilities induced by therapies and their adverse effects [4,5]. Such functioning morbidities diminish quality of life (QL), have a detrimental influence on a person's ability to participate in personal and professional activities, and may even lessen survival rates [6,7]. The harmful effects of therapy-linked morbidities of

carcinoma are apparent over a wide range of its varieties, affecting numerous biological processes, spanning the lifespan of person both during and after intensive therapeutical interventions [8–10]. Patients often have several adverse effects from such a therapy that are even worse than the real disease complaints.

Rehabilitation using holistic healthcare approaches such as Yoga and Ayurveda might lessen the adverse effects of therapy-induced complaints in cancer patients as well as survivors [11,12]. Rehabilitation is a practice that is largely underused, in spite of mounting research and suggestions for inclusive approach of rehabilitation within cancer care [13,14]. This service gap is well understood on a global scale and increases the load of morbidities as the number of cancer- survivors rises [15]. The proportion of survivors would almost quadruple globally in upcoming decades, so addressing this shortage ought to be a prime objective in treating malignancy [16]. The WHO launched Rehabilitation 2030 in 2017 as a calling to action for expanding worldwide availability of advanced rehabilitation as a crucial component for the patients suffering with non-communicable illness [17]. The goal of initiative is to develop a collection of rehabilitation strategies which will help the healthcare systems to deliver their services by increasing availability and recognition of facilities in order to enhance health outcomes. The WHO chose oncology as a strategic emphasis for this project due to the immediate, long-lasting, and delayed impacts of malignancy and therapies connected with it [17].

Alternate therapeutic modalities, like alternative and complementary therapies, that have demonstrated success in fostering good approaches against cancer and able to manage negative effects of standard therapies should be attempted among patients, since a healed person is unlikely of accepting potential adverse effects that may lessen quality of life [18]. In order to regain optimal well-being, the ancient

traditional healthcare services like Yoga and Ayurveda primarily concentrate on the union of body-mind functions. Ayurvedic therapies are frequently provided to patients with the goal of either reducing tumour-related complaints or enhancing quality of life. The goal of Ayurveda is to safeguard healthy people from illness and to treat those who are ill [19]. Additionally, yoga as a supplemental treatment has shown to be a useful approach for cancerous patients who have overcome the disease by enabling them to deal with despair, stress, and anxiousness [19,20]. It has been reported that relaxing responses obtained from combining yoga and meditation techniques have indeed been demonstrated to enhance quality of life, emotion regulation, as well as wellness, by controlling the levels of stress and DNA impairment [21]. This may be helpful for cancer sufferers, who frequently experience physical exhaustion, anxiety, sadness, sleeplessness, and weak muscles [22]. Yoga intervention combined with Ayurveda therapy may increase the psychophysiological health of such patients, along with enhanced probability of longevity [23].

During rehabilitation period, the early phase of investigations to evaluate the feasibility and efficiency of intervention strategies for cancer-survivors during that same time is where the positive outcomes of Yoga and Ayurveda therapies originates. In order to anticipate a further wave of study in this area, it is currently crucial to pinpoint the routes and issues learnt from such investigations. As a result, the present systematic review on integrated approach of Yoga and Ayurveda in cancer rehabilitation is undertaken with following objectives:

- To provide an overview of the studies on therapeutic benefits of Yoga and Ayurveda for carcinoma patients undergoing rehabilitation
- To discuss the efficacy of supportive care for patients with carcinoma
- To evaluate the importance of integrated cancer therapy for enhancing quality of life

2. RELATED WORK

According to Cromes, [24] cancer rehabilitation entails assisting a carcinoma patient in achieving their highest level of physical, societal, mental, and occupational functionalities within the constraints placed by the condition as well as its therapy. Such statement is supported by an allied health care as an approach of cancer

rehabilitation. In their overview of literature on physical activity and cancer management, Courneya and Friedenreich, [25] recognized the rehabilitation period as an important subject for future studies, specifically for experiments to assess the viability and efficacy of exercise programs. This desire in conducting exercise routines at this time is attributed to a variety of variables. Firstly, survivors often see a marked decrease in their strenuous activity as well as other physical activity involvement throughout therapy. Despite years of following with therapy sessions, individual activity levels could not restore. Given the deconditioned situation of cancer survivors and prevalence of acute adverse-effects after medication, there is significant room for improved quality of life, enhanced physiological and immunity functions. As per Stout et al. [26], the suggestions for rehabilitation in oncology protocols have yet to be described, but could offer some insight to strengthen the incorporation of rehabilitation within cancer management system. The results, meanwhile, are in conflict with medical reports of reduced levels of utilization of rehabilitation, indicating that the suggestions of guidelines might indeed be disregarded. Enhancing the framework of rehabilitation therapy may have a significant influence on overall functionality and QL amongst cancer survivors, since bulk of them are adversely impacted by the functioning impairments. A study by Tripathi et al. [23] with an intervention of Ayurveda and Yoga as a supporting treatment shown to improve the bone density and energy levels in carcinoma patients who are diagnosed with osteoporosis. The psycho-oncological approach of cancer that is based on yoga philosophy has been explored by Amritanshram et al. [27] to incorporate the subtle characteristics of mind like prana and soul. According to authors, the cancer management may be improved by utilizing yoga-relied models.

2.1 Risk Factors for the Development of Cancer

2.1.1 Inflammation

The generation of cytokines such as tumour necrosis factor, interleukin-1 (IL-1), IL-6, as well as modified m-RNA activity will contribute for 20percent risk for cancer development [28,29]. According to Ayurveda, cancer manifests as Granthi (benign) and Arbuda (malignancy), that are caused by a vata, pitta, and kapha dosha discrepancy brought on by an unsustainable lifestyle, mental stress, incompatible food-intake,

sufferings, and other factors [30]. Relying on the disturbed doshas, tumour could be inflammatory or non-inflammatory which might be managed with surgery, dietary recommendations, herbal treatment, and wellness regimes such as rasayana (restoring) and vajikarana (rejuvenating) therapy [30]. Shodhana chikitsa are the purifying detoxification techniques in carcinoma therapy that mainly includes panchakarma, which is peculiar to impaired dosha while Shamana chikitsa (supportive care) is typically recommended for debilitated people. In-depth study is being done on the anti-tumour effects of phytochemical components found in herbs like *curcumin*, *green tea* (epigallocatechin gallate), *grapes* (resveratrol), and *guggulsterone*, that contain anti-inflammatory and NF- κ B-regulated genomic inhibiting action [31]. Additionally, regular exercise may be used as the main therapy for cancer and inflammation [32]. Yoga poses which have been demonstrated to modulate markers of inflammation and metabolic risks are indicated for underweight or fragile individuals to practice meditation, breathing exercises, and other relaxation techniques [33].

2.1.2 Oxidative stress

Oxidative stress (OS), a predictor of cancer initiation is known to arise instable free radicals, hindered metabolic processes referred as Reactive Oxygen Species (ROS) and lack of equilibrium in antioxidants [34]. An increased ROS may result in permanent oxidative degradation of lipids, fats, carbohydrates, and nucleic acids, which further promotes cellular damage and disease manifestation [35]. ROS are essential for signalling pathways in cells wherein, their production and removal continue to manage cellular redox equilibrium. The longevity of cancer cells with lower intracellular ROS is facilitated by enhanced ROS formation and inadequate antioxidative defence mechanisms under more hypoxic conditions [36]. Cancer cells seem to be more ROS responsive than healthy cells, which makes them highly susceptible to tumour growth as well as permanent cell damage and death [37]. Significant rise in ROS also promote tumorigenesis. Moreover, it is hypothesized that extrinsic ROS generating therapy by increased OS may be used to specifically kill cancer cells with avoidance of damaging healthy cells [36]. From this perspective, it is possible to infer that hypoxia-induced ROS in cancer cells serve a crucial role in the treatment of malignancy. The

notion of intracellular ROS and its regulation mechanisms in cancer cells meanwhile is a relatively new field of study [36]. The stimulation of glycolysis with increased mitochondrial action and reduced O₂ uptake may accomplish the biological characteristics of cancer cells with less glycolytic pathway and energy metabolism in response to OS as contrasting to normal cells [38,39]. This might be addressed by relaxing techniques like yoga and meditation, which have been found to increase energy metabolism through regularized mitochondrial function and reduced O₂ uptake [40]. Additionally, it is known that OS-induced sperm DNA impairment is a significant contributor for the development of juvenile carcinoma and its associated mortalities in which, yoga and meditation techniques could help to mitigate such uncertainty [41,42]. Further, a number of herbs including *Andrographis peniculata*, *Curcumin*, *Piper longum* and *Withania somnifera* have been shown to be effective against tumour development due to their effective anti-lipo peroxidative activity, antioxidant properties, and induce of OS reduction [43].

2.1.3 Metabolic syndrome

The probability of developing cancer has indeed been linked to metabolic disorders like hyperlipidaemia, diabetes, elevated body mass index, and obese [31]. A relationship between the processes by which cholesterol affects cancer is still debatable, yet it has subsequently shown that oxidized LDL receptor 1 and cancer onset possess a close connection across a variety of paths [44]. Additionally, owing to OS-induced inflammation indicators hyperglycaemia, overweight and low physical activity ultimately result in carcinoma [45]. Through the improvement of body fat metabolism and inflammatory process, a mind-body approach involving yoga and meditation does have the greatest impact on metabolic syndrome [33]. Additionally, herbal remedies for metabolic illnesses like *ginseng*, *berberine*, *bitter melon*, *nigella sativa* and *gymnema sylvestre* are thought to be both harmless and efficient [46]. In accordance with this view, it can be assumed that the associated risk components for emergence of cancer could be managed by utilizing body-mind intervention program that includes Yoga and Ayurveda lifestyle-based intervention.

3. METHODOLOGY

3.1 Search Methods and Screening Standards

With a period ranging from January 1, 2007 until April 30, 2021 articles were searched through PubMed, Web of Science, Embase, Scopus, and Allied Health Plus. Keywords for abstracts and title included cancer, rehabilitation, yoga, ayurveda and clinical studies. Additionally, the citations of papers detailing original study and reviews of the subject that were discovered was examined. Table 1 provides a comprehensive description of inclusion criteria and exclusion criteria. Papers were considered only if they had been published in English with peer-reviewing process. Utilizing Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISM) paradigm, finished reports are gathered initially. Four parts make up the PRISM technique for a thorough evidence-based review process: identification, screenings, qualification, and selection. This raises the possibility of finding most published papers in systemic way [47]. Any kind of cancer sufferers who had just finished adjuvant chemotherapy or radiation therapies, claiming of no intentions for further medication were included in the study's sample (excluding hormonal therapy for breast malignancy). The 'recent time finished' was regarded as having finished therapy equal to or less than six months earlier to enrolment. Yoga training programs with or without flexibility or movement range and ayurvedic treatments like herbal and panchakarma, among other regimes, were 'interventions' which satisfied the criteria. Likewise, to learn more about the pathophysiology, development and course of cancer therapy within traditional healthcare system, the present study reviewed traditional

works of Yoga and Ayurveda [48-50]. For yet more discourse, a thorough summary of every characteristic and treatment options was created. All potential health-linked consequences of cancer and subsequent therapies which might become apparent during rehabilitation phase like illnesses and healing connected complaints, quality of life, physically, sexually or cognitive related skills, qualified as 'outcome' measures that satisfied the criterion. The pre-post grouping testing research, controlled and randomly selected clinical studies have been the types of papers which satisfied the 'comparative' criteria for inclusion. The grouping investigations were crucial to incorporate because they are frequently employed in more recent scientific disciplines.

3.2 Extracting Data and Quality Evaluation

Every descriptive parameter of studies, such as the period between termination of therapy and enrolment within research, experimental design, sample features, and recruiting information, were retrieved. Descriptive information on the intervention model, such as its timeframe, intensity, and regularity, as well as its commitment or conformity, too were retrieved. The evaluation of impact of on healthcare outcomes was accomplished by extracting the findings. An approach outlined by Stevinson et al. [51] was used to evaluate the quality of selected papers for reviewing of yoga, ayurveda, and cancer all across the field. The adoption of a) randomization for group allocating, b) an efficient randomizing mechanism, c) intent-to-cure assessment and d) blinded data feeds from group allocation were regarded as four essential elements of the employed methods.

Table 1. Selection criteria for studies

Inclusion	Exclusion
Published papers from January 2008 to April 2021	Papers which are not peer-reviewed publications and not in English
Studies with cancer diagnosed samples	Reported experimental protocols for existing or upcoming studies
Subjects aged 18 years or above	Case study involving below 12 participants
An approach for rehabilitation which emphasises involvement, health-associated quality of life, or physically, sexual, and cognition capacities	Feasibility or pilot experiments
Controlled intervention studies utilizing a single or a variety of methods	Intervention studies using control group who are not suffering with cancer

4. RESULTS

Fig. 1 displays many cancer categories researched by functional domain with interventions reaching statistically significant. Fig. 2 and Fig. 3 depict the stages of therapy examined for research and their context with therapies obtaining statistically significant. 670 citations were found after search terms. Around 535 articles were found, which are not matching the criteria for inclusion after reviewing of abstracts and titles. To perform a more thorough analysis, entire contents of rest 135 papers were extracted. Using the study requirements, 120 papers were eliminated and 15 papers were

selected to this review [Fig. 4]. Majority of studies that were chosen dealt with cancer rehabilitation, impact of complementary and alternative medication, application of yoga-based intervention strategies and ayurvedic medication. The study subjects involved survivors of various malignancies that comprised breast cancer as a dominant finding, accompanied by thyroid cancer, head and neck cancer. Age group of respondents varied from 18 to 71 years, with majority of experiments encompassing a broader age group. The investigations enrolled both genders (male and female), with the exception of breast cancer survivors who were female. Table 2 illustrates the features of selected studies.

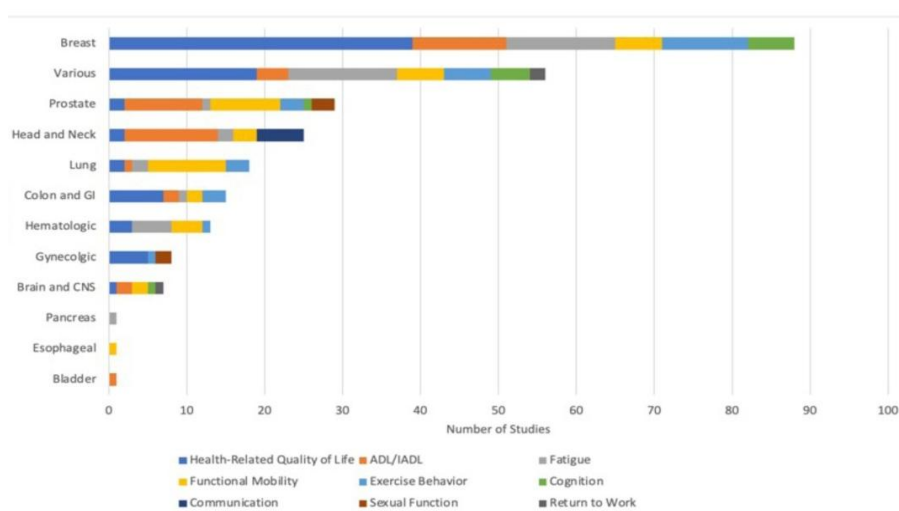


Fig. 1. Functional analysis of cancer types using interventions attaining statistical significance

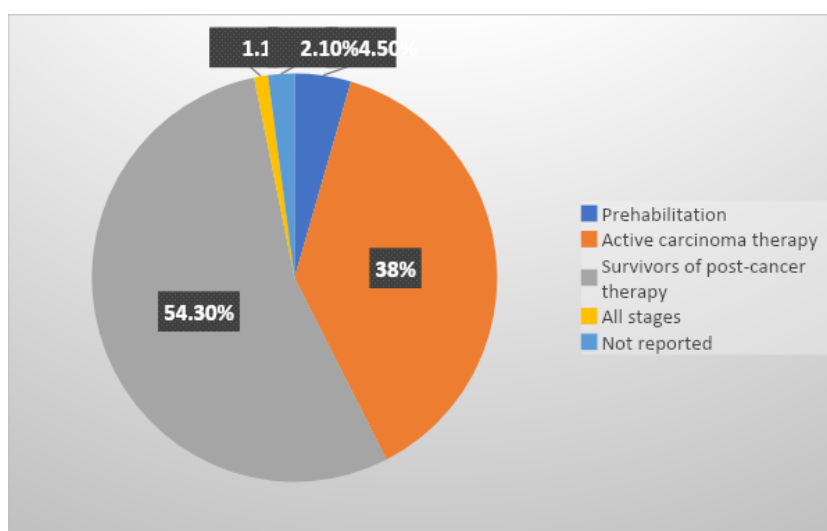


Fig. 2. Treatment stages investigated for trials where interventions achieved statistical significance

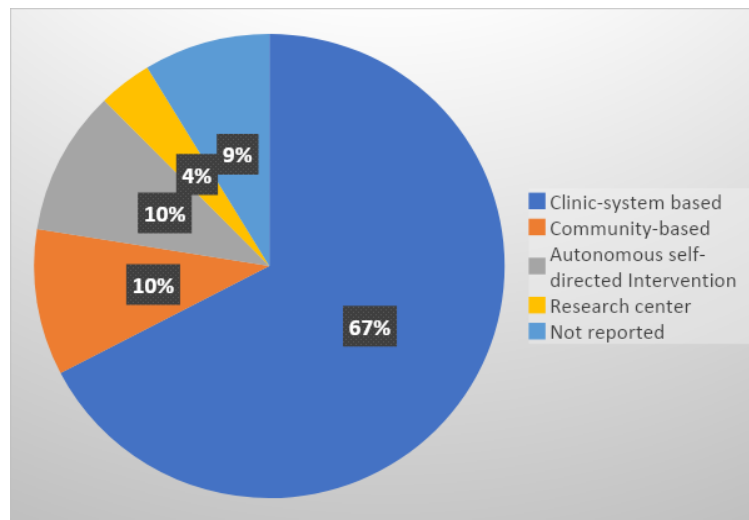


Fig. 3. Study interventions in treatment settings that are effective in terms of statistics

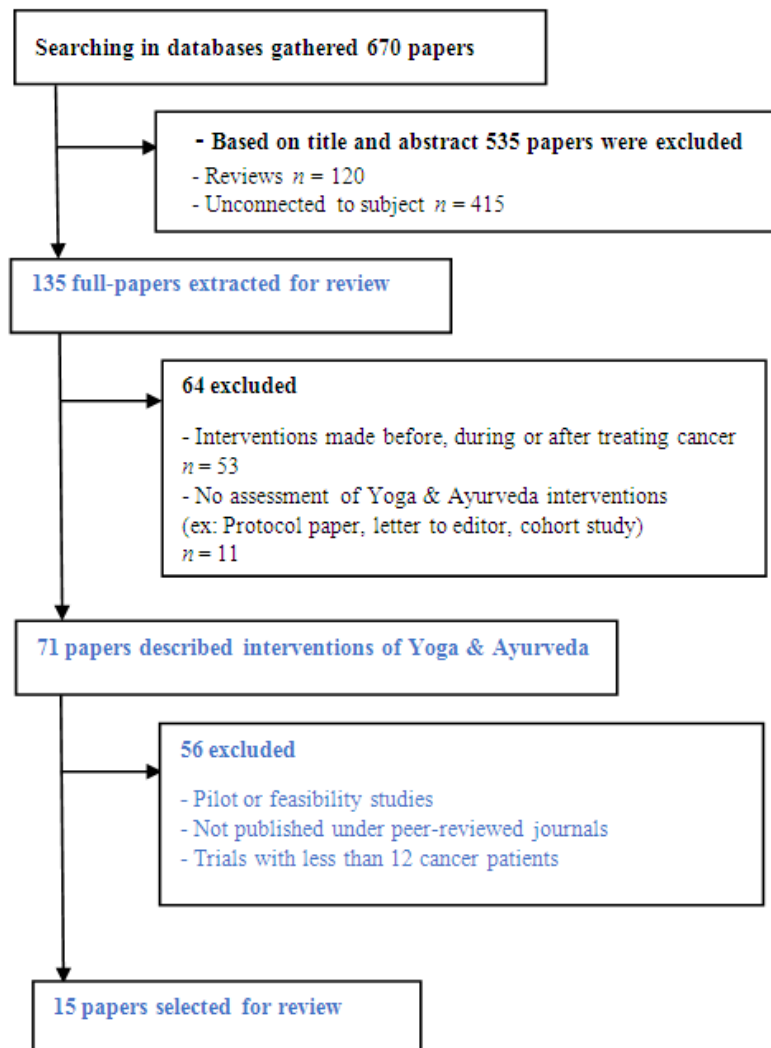


Fig. 4. Schematic of study selection method

Table 2. Characterization of selected studies

Authors	Indication	Intervention	Study design	Sample size	Results
Bower et al. [52]	Breast cancer	Iyengar Yoga for 12 weeks; 90-min group classes; twice per week	Randomized Control Trial (RCT)	31	Significant effects in depression ($P > .05$), fatigue ($P < .00$), sleep trouble ($P > .05$); perceived stress, functional outcome (all $P > .05$)
Carson et al. [53]	Breast cancer	Yoga of Awareness Program for 3 months; 120-minutes per week group classes	RCT	37	Effective changes in negative mood (concerning negative mood on daily basis) ($P < .00$) and increased acceptance (symptom-associated suffering) ($P < .00$)
Moadel et al. [54]	Breast cancer	Hatha Yoga for 3 months; 1.5 hour per week classes	RCT	128	Significant effect in social well-being ($P < .00$), quality of life ($P < .00$), spiritual wellness ($P < .00$), and mood distress ($P < .03$)
Chandwani et al. [55]	Breast cancer	Patanjali Yoga Sutra for 3 months; twice per week group classes	RCT	61	Significantly improved sense of overall health ($P = .00$) and physical functions ($P = .04$); fatigue ($P > .05$); depression ($P > .05$); sleep grade ($P > .05$)
Danhauer et al. [56]	Breast cancer	Healing Yoga for 10 weeks; 75-minutes per week group classes	RCT	44	Significantly improved mental health ($P = .05$); spiritual wellness ($P = .00$); depression ($P = .02$); positive affection ($P = .01$)
Lengacher et al. [57]	Breast cancer	Mindfulness stress reducing therapy for 6 weeks of duration	RCT	84	Effective changes in fatigue ($P < .00$), sleep trouble ($P < .00$), overall activities ($P < .00$)
Banerjee et al. [58]	Breast cancer	Integrated Yoga Program for 6 weeks of duration	RCT	68	Significantly improved anxiety ($P < .00$), depression ($P < .00$), perceived stress ($P < .00$)
Raghavendra et al. [59]	Breast cancer	Integrated Yoga for 4 weeks of duration	RCT	62	Significantly improved symptom of nausea: in frequency ($P = .01$), intensity ($P = .01$), preventive nausea ($P = .01$) as well as vomiting ($P = .05$); significantly improved anxiety ($P < .00$),

Authors	Indication	Intervention	Study design	Sample size	Results
					depression ($P < .00$) and quality of life ($P < .00$)
Rao et al. [60]	Breast cancer	Integrated Yoga for 4 weeks of duration	RCT	69	Significantly improved anxiety ($P = .04$), anxiety traits ($P = .00$), depression ($P = .01$), distress ($P < .01$) and improved quality of life ($P = .01$)
Rao et al. [61]	Breast cancer	Integrated Yoga for 24 weeks of duration	RCT	98	Significantly improved anxiety ($P < .00$) and anxiety trait ($P = .00$)
Rao et al. [62]	Head and neck cancer	Gargling with <i>Curcuma longa</i> herbal decoction	Single-blind, randomized, controlled clinical trial	80	Significantly reduced radiation-induced oral mucositis ($P < .001$), raised tolerance of mucositis ($p < .001$)
Ravindran et al. [63]	Head and neck cancer	<i>Varunadi Ghrita</i> , 5 gm twice per day for 1 year and followed up to 2 years.	RCT	78	Significantly higher CD3, CD19, and CD16 positive cells (all $P < .001$) revealing an immunomodulatory effect of the study compound
Nakayama et al. [64]	Thyroid cancer	Aromatherapy with lemon (1.0 mL) and of ginger (0.5 mL) essential oils	RCT	71	Effective over the treatment-induced salivary gland damage ($P = .05$)
Konmun et al. [65]	Adjuvant therapy in cancer	6-Gingerol 10 mg twice per day for 12 weeks of duration	A phase II randomized double-blind placebo-controlled study	88	Significantly higher complete response rate in nausea, vomiting induced by chemotherapy with Mean FACT-G score ($P < .001$). Highly improved appetite and quality of life
Rashad et al. [66]	Head and neck cancer	Topical application of pure natural honey in radiochemotherapy induced mucositis	RCT	40	Significant reduction in <i>Candida</i> colonization ($P = .003$) and effective inhibition of grade IV mucositis development

5. DISCUSSION

This systematic review examines cancer rehabilitation with an emphasis on an integral strategy of Yoga and Ayurveda healthcare system. The aggregate findings suggested that yoga can enhance health associated quality of life by reducing anxiety, depression, and gastrointestinal problems [52-61]. Subgroup analysis revealed that duration as well as intervention had a significant impact on the outcome of yoga intervention. The evaluation tools utilized in selected studies have high levels of construct validity and consistency reliability. This will indicate them as a reliable predictor of quality of life as it pertains to one's health. Yet it must be observed that these trials did not investigate the impact of variables like age, weight, ethnicity, education, revenue and marital status of patients on their wellness. In earlier studies, yoga has been shown to benefit cancer patients and survivors with symptoms like anxiety and depression [67,68]. The results of present study corroborated with these outcomes. The relaxation response obtained from integrative yoga practice might lessen the stress activation in cancer patients, thus reducing the levels of anxiety and depression. According to contemporary ideas, habits like smoking and alcoholism may cause a raised chronic condition particularly cancer, whose therapies particularly radio-chemotherapies are extremely toxic and both harms nearby normal cells. A secondary effect could be immediate or delayed. Chemotherapy adverse effects include nausea, vomiting, dysentery, baldness, oral thrush and bowel problems while radiation can lead to exhaustion, loss of appetite, upset stomach, vomit, disturbed sleep, skin dryness and others. Tonsillitis, acid reflux disease, laryngitis, chronic dysphagia, tiredness, liver toxicity, and sterility are some instances of prolonged complications [69]. Death can occasionally be brought on by organ dysfunction, metastatic spread, OS, inflammatory and haemorrhagic condition. The complementary and alternative therapies have drawn huge attention of numerous researchers and healthcare experts because of negative outcomes of standard treatment of cancer. Yoga and Ayurveda have been utilized in combination to combat the side effects of post-chemotherapy circumstances in cancer [70,71]. One RCT in the study is reported that yoga intervention effectively reduced nausea and fatigue by 12% and 18% respectively while the intensity of vomiting was reduced by 9% when compared to controls [59]. Yet it is entirely unclear about the

calmness fostered by yoga. Yoga therapies might improve the sense of balance and develop spiritual consciousness. The analysis on ayurveda interventions included in present study clearly demonstrate their beneficial effects on treatment-induced complaints in cancer patients [62-66]. Despite the fact that many studies have suggested using ginger supplements to reduce nausea and vomiting brought on by chemotherapy, none of them employed a standardized bioactive compound [72]. In this aspect, a selected randomized double-blind trial shown the protective efficacy of 6-gingerol compound against nausea and vomiting induced by chemotherapy treatment. Further, it has shown significant improvement in patients' appetite and quality of life [65].

From an Ayurveda viewpoint, an imbalance in tridosha is the main cause for disease onset. Tridosha are the body humours or functional units like Vata (air-space element), Pitta (fire-water element) and Kapha (earth-water element) which are present throughout the body. At cellular level Vata is responsible for signal pathways, cell movement and division; Pitta for balanced basal metabolism and Kapha is responsible for energy storage [73]. The adverse reactions in cancer seems to occur due to an aggravated and disturbed Pitta dosha as well as Rakta dhatu (blood, plasma). The efficient Ayurvedic therapies like ahara (dietary regimen), vihara (lifestyle regimen), panchakarma therapy (purificatory and rejuvenation therapy), and shamana chikitsa (palliative treatment) with beneficial herbs could enhance life span of patients through improved quality of life and alleviating symptoms. Ashwagandha contains more antioxidant properties, that is shown to generate ROS and mitochondrial dysfunction in cancerous cells. Additionally, distinct extracts of Ashwagandha possess greater capacity to kill cancer cells [74]. The topmost choice for cancer treatments includes *Bacopa monniera*, *Glycyrrhiza glabra*, *Ocimum sanctum*, *Terminalia chebula*, *Phyllanthus emblica*, *Hydrocotyle asiatica*, *Asparagus racemose*, *Nordostachys jatamansi*, and *Tribulus terrestris* [43]. Likewise, different herbs and natural remedies utilized in the selected trials of study found to be supportive for cancer patients [62-66].

As per yoga scriptures, human body is comprised of five layers of awareness or true self called as '*pancha kosha*' (Pancha-five; Kosha-layer). These layers begin with the physical body and moves inwards to the core of self. The

Pancha kosha are: *Annamaya kosha* (physical existence), *Pranamaya kosha* (subtler energy or prana), *Manomaya kosha* (instinctive psyche), *Vijnanamaya kosha* (intellect or discriminatory psyche), and *Anandamaya kosha* (happy, peaceful condition). According to Upanishad, whenever a person is firmly grounded in *Anandamaya kosha*, he is in great equilibrium with environment and good well-being because of everlasting feeling of self-being, as well as the causative condition of life forms from which all other *kosha* arise [27]. When mankind experiences the highs and lows of living (whether via exposing of exterior assaults like damage or sickness or emotional tough circumstances), it creates a disparity. Scripture emphasizes the fact that such disharmony results from an absence of brilliance over psyche, which is the root cause of all mind-body illnesses. A yoga Vasistha treatise by Sage Vasistha [75] outlines the development of all this disharmony which leads to cancer (likewise, other lifestyle-linked disorders). According to yoga description of stress, the character of a struggle or discomfort is portrayed as an 'unregulated reprocessing of phrases in the psyche i.e., *Manomaya kosha*. If left unchecked, such disharmony resulting from unrestrained movement (*udvega*) of inhibited feelings permeates into the *Pranamaya kosha*. This can be identified by a disrupted respiratory rhythm (higher pace with uneven pattern) as well as impaired metabolism. The procedure goes on and concentrates in sole area of physical body (*Annamaya kosha*), thereby leading to inconsistent biochemical reactions through an erratic flow of *prana* (life force power). This suggests that aggressiveness or conflict experienced mentally is reflected within physical confrontation (inflammatory condition). Inflammation is a characteristic of malignancy, which has become a wide-established reality. Therefore, it appears that unchecked extreme *prana* (subtler energy) movement alters the apoptotic regulation, leading to eternal cells as well as the persistence of cancer cells at molecular scale. The narratives continue to say that origin of this illness relies on both interior (heredity) and exterior (injury by oncogenic elements, trauma, poisons, etc.) components.

Glancing across all of literature research, it could be inferred that Yoga and Ayurveda integrated strategy are clinically useful for cancer sufferers as an alternative to standard medical care. However, no single study with relevant data has been found that combines therapeutic efficacy of both Yoga and Ayurveda against cancer and

treatment-induced adverse effects. Further, there are number of reasons that make the clinical relevance of Yoga and Ayurveda therapies difficult such as: an inadequate amount of data to support their effectiveness, a dearth of clinical suggestions due to practitioner attitudes, the diversification of patient group with cancer and practical issues. Hence, it is necessary to encourage Yoga and Ayurveda incorporation that may offer a wide range of advantages for cancer-survivors during recovery process, despite variances in subjects, experimental designs and interventions amongst investigations. These are vital for assessing the integrity of previous works under this topic, despite fact that it was beyond the scope of this review to address them in depth.

6. CONCLUSION

In accordance with the study, combining body-mind therapy with lifestyle interventions relying on Yoga and Ayurveda may help cancer patients to live better and recover their psychosocial wellbeing. In course of their rehabilitation, cancer-survivors have become the subject of certain intervention programs. Methodological flaws in these experiments are clear, as one could anticipate from growing field of investigation. Despite such drawbacks, preliminary research suggests that complementary and alternative therapies are viable, which might assist cancer patients physically and psychologically while they are undergoing rehabilitation. The discipline must now be advanced by future research with robust research approaches.

7. STUDY LIMITATIONS

Despite an intensive literature exploration was done, it is indeed feasible that some qualified investigations were slipped. The notion that several previous investigations evaluated numerous outputs, yet only disclosed favourable results, which has raised the possibility of prejudice even when each documented study was considered. Contrarily, relying on scientific research would often lead to the selection of more robust investigations, as these trials seemed sure to have their data disclosed irrespective of output. An explanation of tendencies in results had not been considered appropriate at this moment due to the limited number of papers and variation in demography, intervention strategies, outputs and follow-up timeframes.

8. FUTURE PROSPECT

In order to progress a realm, scholars examining complementary and alternative approaches during rehabilitation are urged to: establish a standard timeline for defining recovery period and assess output alterations which is more pertinent toward this moment, such as participants' functional capacity, quality of life, behavioural changes, as well as other mental conditions. Scholars are prompted to include following information when summing up assessments of yoga intervention strategies for cancer-survivors during rehabilitation phase namely: a) Timeframe (the number of months or weeks across post-cancer care and research enrolment; b) Conformance with implementation practices and yoga training program; c) Sample size and comparative with pre-detected medically relevant sample size; d) Achievement and flaws with recruiting and intervention.

Currently, diets with minimal fat and powerful antioxidants are being prioritized in order to increase cancer survival rates [76]. Foods, particularly of excessive fat content like cheese, butter, palm and coconut oil may hasten the growth of cancer, whereas foods containing higher antioxidants like fruits and vegetables are generally thought to be healthy [77]. The antioxidant contents in plant-relied foodstuffs are usually higher than that of animal-based in which, majority will contain herbs and spices [78]. Meanwhile, it is necessary to investigate the potential health benefits of comprehensive spices and herbs in addition to nutrition-relied investigation which can clarify the complexities of dietary impact on chronic conditions, despite the fact that several experiments are performed on individual phenolic constituents of spice mixtures and herbs. Further, to connect key indicators of transdisciplinary and individualized therapy, research is still needed to link expression of genes and cancer subcategories [79]. This can make it easier to tailor a medication of patients as per their unique needs. Even though personalized medicine is used in medical advances, Ayurveda places a greater value on individualized therapeutic intervention because it recognizes that every person has a unique body constitution or body type called prakriti. Each prakriti composed of various ratios of tridoshas such as vata, pitta, and kapha with unique metabolic and psycho-physiological characteristics. As per body constitution, there seems to be a connection among expression of

unique HLA gene that every person displays and their varying necessity of energy [80]. Hence, to achieve harmonized whole-body energy equilibrium, a lifestyle change strategy which can affect metabolic profile of an individual must be documented. According to a new analysis, practicing yoga could efficiently control the degree of metabolic functions with respect to a specified body constitution (Prakriti) [81]. With this perspective, it may be stated that constitutional medication may be more effective to treat malignancy because clinical presentation of each person is unique. Additionally, novel studies utilizing integrative approach of Yoga and Ayurveda must be performed on treating cancer, by taking into account the idea of numerous regulatory mechanisms in OS, probability of metabolic abnormalities and inflammatory markers linked to disease onset.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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