Ayurvedic Dietary Interventions in Cancer Management: A Review

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Abstract - Ayurveda, an ancient system of medicine, offers unique insights into the role of diet and lifestyle in cancer management. By understanding the *Doshas* and the importance of *Agni,* Ayurveda provides a holistic approach to supporting conventional cancer treatments. Objectives: This review critically evaluates Ayurvedic interventions, particularly food-based strategies, in cancer management. It aims to highlight Ayurveda's scientific basis and its potential synergy with conventional treatments. Focusing on studies investigating Ayurvedic dietary approaches, it examines outcomes like treatment response, quality of life, and adverse effects to offer insights into Ayurveda's role in cancer recovery. Data Source: Contemporary journal, articles, internet material, and previous research papers related to these subjects have been used. Methods: This review critically assesses existing literature on Ayurvedic dietary interventions in cancer management. Studies focusing on food-based strategies and their impact on treatment response, quality of life, and adverse effects are analyzed to evaluate the scientific basis of Ayurveda in cancer care. Results & Conclusions: Ayurvedic dietary interventions complement cancer therapies, reducing toxicities and enhancing outcomes. Studies show Ayurvedic herbs support immune function and patient well-being. Integrating Ayurveda with conventional treatments offers comprehensive cancer care, improving efficacy and quality of life through personalized nutrition and lifestyle modifications.

Keywords: Ayurvedic Dietary Interventions, *Doshas, Agni,* Cancer Management.

1. INTRODUCTION

Globally, cancer remains a significant contributor to both mortality and morbidity, affecting humans through over 200 distinct types. The on-going rise in the global cancer burden is attributed to factors such as population aging, overall population growth, and the increasing prevalence of cancer-causing behaviours. While overall cancer mortality rates exhibit similarity, the occurrence rates in developing countries are approximately half those in developed nations for both genders. In impoverished regions, cancer survival rates tend to be lower, likely due to a combination of delayed diagnosis and limited access to timely and appropriate treatment[(1)]. Frequent cancer therapies, such as radiation therapy and chemotherapy, can sometimes be ineffective in curing the disease completely and have negative side effects. Therefore, there is a crucial need to focus on delaying the onset of the disease, managing its progression, or preventing it altogether[(2)]. Many cancers are preventable, as they often result from modifiable environmental and lifestyle factors[(3)]. Experimental data underscores a clear linking between oxidative damage, cancer, and the aging process. Epidemiological observations reveal that a diet abundant in fruits and vegetables is connected with a reduced incidence of certain cancers and an extended life expectancy. Research efforts, both in human studies and experimental trials; have been devoted to comprehending the effects of antioxidants naturally present in fruits and vegetables. This research aims to uncover strategies that contribute to cancer prevention, recognizing the significance of lifestyle modifications in promoting overall health and well-being[(4)].

In recent decades, there has been a significant surge in research focusing on various complementary and alternative medicines (CAM) practices for cancer management. Ayurveda, a traditional system of medicine originating from India, has garnered substantial attention for its historical success in utilizing natural remedies to prevent or suppress various types of tumours through diverse treatment modalities. This ancient healing system employs a holistic approach to address not only the symptoms but also the underlying causes of diseases, including cancer. The utilization of numerous natural

substances in Ayurvedic treatments has been explored as a potential avenue for enhancing cancer care and management[5].

1.1 Cancer: Conventional Perspective

The primary causes of cancer are a combination of genetic and environmental factors. Environmental factors are responsible for 90-95% of cancer cases, while genetics contribute to 5-10%. Known environmental risk factors for cancer include tobacco use, certain infections, radiation, and lack of physical activity, obesity, and exposure to environmental pollutants. On the other hand, genetic factors involve rare genetic accidents occurring together in one cell with cumulative effects, involving multiple steps governed by intrinsic factors like oncogenes, tumor suppressor genes, DNA repair genes, angiogenesis, stem cells, and hormones, as well as extrinsic factors like infection, radiation, and environmental pollutants.

Cancer development is highly complex and involves the interplay of various factors. Oncogenes, which are damaged genes, stimulate excessive cell growth and division, contributing to cancer development. Tumour suppressor genes, when lost or inactivated, can also lead to cancer by allowing uncontrolled cell growth. Mutations in DNA repair genes can lead to a failure in DNA repair, allowing subsequent mutations in other cancer-related genes to accumulate. Additionally, hormones play a role in promoting cell proliferation, particularly in sex-related cancers.

Furthermore, environmental factors such as exposure to mutagens and carcinogens, like tobacco smoke, are known to cause DNA mutations and are strongly associated with various forms of cancer. Radiation exposure, both ionizing and nonionizing, is also a significant environmental factor contributing to cancer development.

In summary, while genetic factors involve rare genetic accidents and intrinsic cellular processes, environmental factors encompass exposure to mutagens, carcinogens, and radiation, as well as lifestyle and dietary choices, all of which contribute to the development of cancer.

1.2 Ayurvedic: Insights into Cancer

The Ayurvedic concept of cancer is described in ancient Ayurvedic texts such as *Charaka* and *Sushruta Samhitas*. These texts define cancer as inflammatory or non-inflammatory swelling, categorizing them as either *Granthi* (minor neoplasm) or *Arbuda* (major neoplasm). According to Ayurvedic literature, cancer is classified based on the imbalance of the three body-control systems - the nervous system (*Vata* or air), the venous system (*Pitta* or fire), and the arterial system (*Kapha* or water). Benign neoplasms (*Vataja*, *Pittaja* or *Kaphaja*) are characterized by one or two of these bodily systems being out of control, while malignant tumors (*Tri-Dosaja*) are harmful as all three systems are affected[5].

Ayurvedic texts also outline the therapeutic approach to cancer, which includes *Prakritisthapani Chikitsa* (health maintenance), *Roganashani Chikitsa* (disease cure), *Rasayana Chikitsa* (restoration of normal function) and *Naishthiki Chikitsa* (spiritual approach)[6]. It categorizes the progression of disease into six stages, encompassing aggravation, accumulation, overflow, relocation, build-up in a new location, and manifestation into a recognizable disease. Ayurvedic practitioners possess the ability to identify an ailment in its early stages of bodily imbalance, and their treatment methodology focuses on restoring equilibrium by addressing deficiencies and mitigating excesses. Surgical interventions are reserved for advanced cases, with an emphasis on holistic therapeutic approaches[5].

The treatment modalities for cancer in Ayurveda have evolved over time, with ancient physicians using herbal medicines for early-stage cancer and surgery for advanced cases. Additionally, Ayurvedic texts from different periods provide numerous remedies to treat internal and external neoplasms, reflecting the continuous development of cancer treatment modalities in Ayurveda.

The Ayurvedic technique of medicine recommends over 700 plant-based medicines, incorporating spices and food additives to promote overall well-being[7]. Despite its millennia-long existence, the scientific community has only recently begun to earnestly explore its principles. A new paradigm for food-

based cancer prevention and treatment can be developed by following Ayurvedic principles, which may lessen the impact of this cancer..

This review aims to critically assess the existing literature on Ayurvedic interventions, specifically focusing on food-based strategies, within the context of cancer management. By synthesizing the available evidence, this review seeks to elucidate the scientific underpinnings of Ayurveda and its potential role in supporting conventional cancer treatments. This review will concentrate on studies investigating Ayurvedic interventions, with a primary emphasis on dietary strategies. Outcomes of interest, such as treatment response, quality of life, and adverse effects, will be explored to provide a overview of the current scientific landscape regarding Ayurvedic approaches in cancer recovery.

2. AYURVEDIC PRINCIPLES IN CANCER MANAGEMENT

2.1. *Doshas* and Cancer

The fundamental Ayurvedic principle that describes the underlying cause of cancer is the imbalance of the body's energies, or *Doshas*. *Doshas* control the activities of the body - they determine the health and disease of an individual. Imbalance of *Doshas* is the main etiological factor of diseases. The etymology of the word "*Dosha*" - it is derived from the root "*Dush*" which means "to cause harm" and "to vitiate". A careful study of the ancient Ayurvedic texts discloses that three bodily humours termed as *'Tridosha'*, (*Vata*, *Pitta* and *Kapha*), the seven basic tissues (*Rasa*, *Rakta*, *Mamsa*, *Meda*, *Asthi*, *Majja* and *Shukra*) and the waste products of the body such as faeces, urine and sweat etc. are referred to in the context of causation of a disease[8]. Interestingly, no description of cancer is evident in the classical Ayurvedic scriptures, attributing to the fact that cancer was not identified as a distinct disease entity at that time and there was no facility of its clinical and laboratory examination as well, such as a scanning, MRI or biopsy. However, a profound knowledge and understanding of *Doshas* enhance the capacity of an Ayurvedic physician to diagnose cancer at the early stage and manage by various modalities of Ayurvedic therapies, lifestyle and dietary advices. It is believed that the current advancements in the field of genetics, modern cell biology and cancer biology research validate the Ayurvedic concept that cancer is caused by the damage of our inherited genetic code[9]. Ayurveda describes that cancer is a complex of diseases that is caused by low *Ojas* (primary vitality and immunity) and a variety of typical and extreme imbalances of one or more bodily systems. It is believed that abnormal cell production and growth will occur when the particular tissue elements in which *Majja Dhatu* (the body's nerve tissues) is predominantly obstructed by the imbalanced *'Vata'* and the *'Pitta'*[10].

2.2. Concept of *Agni* in Ayurveda

Ayurveda plays a significant role in the prevention, palliation, treatment, and support of cancer[11].Ayurvedic medicine can be used in conjunction with chemotherapy or radiation therapy as an adjuvant or co-therapy, helping to minimize the toxicities of these treatments[12]. In the context of cancer management, Ayurveda emphasizes the concept of *Agni*, which refers to the digestive fire responsible for the transformation and assimilation of nutrients[13]. *Agnikarma*, a therapeutic heat burn therapy, is mentioned in Ayurvedic texts as an effective procedure for managing pain[14]. Ayurveda also describes the clinical conditions of *Granthi* and *Arvuda*, which have similarities with benign and malignant tumors respectively[15]. The treatment strategy in Ayurveda for cancer includes surgical, parasurgical, and medicinal treatments. Overall, Ayurveda offers a holistic approach to cancer management, focusing on maintaining the health of individuals and promoting physical, psychological, and spiritual well-being.

2.3. Role of *Ama* in Cancer Development & Balancing *Doshas* for Cancer Prevention

The formation of *Ama* (toxins or undigested matter in the body) occurs due to an imbalanced digestive fire creating toxins in the body that can lead to disease. There are several factors that can contribute to the buildup of *Ama* including poor diet, weak digestion, and a weak immune system. In addition, imbalances in the three *Doshas* can also play a role in the development of cancer. The *Doshas* are *Vata*, *Pitta*, and *Kapha* and they are formed by various combinations of the five elements and can be manifested in the body in different ways. For

example, *Vata* is made up of the elements of space and air, and is associated with bodily movement and the nervous system. Its main site is in the colon. When out of balance, the article explains, *Vata* can cause the collection of *Ama* in the body as well as cell damage leading to cancer[16]. The key to successful cancer management, however, is to bring equilibrium to the body and to the *Doshas* and to keep the digestive fire strong so as to prevent the formation of *Ama*. As with most chronic illnesses, the disease that results from *Dosha* imbalance, that is, cancer is not a product of any single, sudden event. Rather, some contributing factors to the condition can be chronic and can span over a long period of time and it is no different in the Ayurvedic perspective of the development of cancer. When an individual's bodily tissues and functions are adversely affected by the overabundance of *Ama*, the *Doshas* become disturbed and cellular activities can be altered leading to cancer. Ayurvedic lifestyle modification will focus mainly on the prevention of disease and the maintenance of the quality of life. By preventing an established disease from getting worse, one could prevent the development of the *Ama* and the associated disturbance in the *Doshas* that can lead to cancer. As for the cancer patients who are seeking a more holistic approach, so as in treating people with established cancer, Ayurveda also plays a role in the healing process[17]. With the eradication of the *Ama* and the restoration of the balance of the *Doshas*, the normal cellular activities can be re-established and the Ayurvedic therapies will promote the well-being of the cancer patients.

3. SCIENTIFIC EVIDENCE SUPPORTING AYURVEDIC DIETARY INTERVENTIONS

3.1. Studies on the effects of Ayurvedic diet in cancer patients

Ayurvedic medicine can be used in conjunction with chemotherapy or radiation therapy as an adjuvant or co-therapy, minimizing toxicities and side effects[18]. Ayurvedic treatment also helps to improve the quality of life of cancer patients[19]. In a pilot study, a hypothetical compound showed significant improvement in subjective parameters like general well-being, pain, and indigestion in cancer patients[20]. Ayurveda can also be effective in delaying the onset and reducing the severity of radiotherapy-induced oral mucositis in head and neck cancer patients[21]. The combination of Ayurvedic interventions with conventional therapies reduces the cost of treatment and decreases the relapse of disease and adverse events. However, specific studies on the effects of Ayurvedic diet in cancer patients were not found in the provided abstracts.

3.2. Mechanisms of action behind Ayurvedic dietary interventions

Ayurvedic dietary interventions work through various mechanisms of action. Ayurveda emphasizes the importance of diet in promoting and preserving health, as well as in treating diseases. It is believed that specific food articles can release enzymes within the body to protect and rebuild cells, and Ayurveda classifies food into different groups based on their qualities and effects on the body[22]. Ayurvedic preparations have been found to enhance the immune system, particularly through the activation of natural killer cells and T helper cells[23]. In the context of neurological diseases, Ayurvedic herbs have been shown to regulate signaling processes involved in the pathogenesis of these diseases, such as G-protein signalling and acetylcholine signals[24]. Additionally, Ayurvedic formulations have been found to have immunomodulatory effects and can reduce body weight, fasting blood glucose levels, and improve biochemical parameters in obesity and type II diabetes[25]. These findings suggest that Ayurvedic dietary interventions can have diverse mechanisms of action, including immune enhancement and regulation of signaling pathways.

3.3. Comparison with conventional dietary recommendations

Integrative medicine approaches combining Ayurvedic dietary interventions with conventional cancer treatments have shown promise in improving patient outcomes. Ayurveda can be used as an adjuvant or co-therapy with chemotherapy or radiation therapy, minimizing toxicities and supporting cancer treatment[11]. An integrative technique to cancer management, combining pooling evidence-based complementary medicines/therapies with orthodox treatment, can address modifiable determinants such as stress, poor nutrition, lack of physical activity, poor sleep, and Vitamin D deficiency, leading to improved overall health and

outcomes for cancer patients[26]. Dietary interventions, such as caloric restriction, infrequent fasting, and ketogenic diets, have listed potential in reducing treatment toxicity and increasing effectiveness of chemotherapeutics[27]. Integrative medicine approaches, including complementary drugs, have been found to improve quality of life and extend overall survival in patients whose cancer therapies have failed[28]. Further research and well-designed clinical trials are needed to confirm the effectiveness of integrating Ayurvedic treatment approaches with conventional cancer care[20].

4. INTEGRATING AYURVEDIC DIETARY INTERVENTIONS INTO CANCER TREATMENT

4.1. Collaborative approach between Ayurvedic and conventional medicine

Collaboration between Ayurvedic and conventional medicine is being explored in various contexts. In the field of rheumatology, a combination treatment of Ayurvedic drugs with conventional DMARDs showed promising outcomes in the treatment of chronic RA[29]. In the field of traditional medicine research, there is a need for collaboration between Ayurveda and in silico biology to explore the bioactive phytochemicals of Ayurvedic herbs[30]. The importance of collaboration between Indian traditional medicine practitioners and US researchers was emphasized in a workshop on traditional medicine[31]. In Burkina Faso, a pilot project aimed at accompanying traditional women healers in obtaining licenses highlighted the need for collaboration between traditional and conventional medicine practitioners[32]. In the case of ulcerative keratitis, Ayurvedic treatment was effective in healing the corneal ulcer and improving vision, demonstrating the potential of Ayurveda in collaboration with conventional medicine[33].

4.2. Challenges and considerations in implementing Ayurvedic diet

Implementing an Ayurvedic diet presents challenges and requires careful considerations. Ayurveda emphasizes the personalized approach to dietetics, taking into account an individual's constitution and *Dosha* imbalance[34]. The quality of food is assessed subjectively based on taste, attributes, potency, and metabolized taste[35]. Ayurveda also highlights the importance of regulating digestive power and warns against the complications of wrong food combinations[36]. Proper nourishment of the body is dependent on a healthy mind[37]. Additionally, Ayurveda recommends specific food combinations, such as Moringa + wheat flour + jaggery, for lactating mothers to address malnutrition[36]. Ayurvedic nutrition considers factors like taste, potency, and post-digestive effect in classifying food. The concept of bio-balanced diet and the use of special medicinal food supplements called *Rasayana* are also emphasized. Implementing an Ayurvedic diet requires understanding individual needs, considering food attributes, and ensuring proper digestion and food combinations.

4.3. On-going clinical trials on the use of Ayurvedic dietary interventions in cancer management.

Current research on the use of Ayurvedic dietary interventions in cancer management is limited. In a current publication, importance was placed on the necessity for expanded, well-regulated trials providing to the specific requirements of cancer survivors, incorporating racial/ethnic minority groups and paediatric cohorts[38]. A pilot study was presented, investigating the effectiveness of a native anticancer formulation; however, additional investigation and wider clinical trials are necessary[18]. In one of the study, highlights the potential advantages of multimodality interventions, incorporating dietary and lifestyle features, for prostate cancer patients, indicating a necessity for comparable investigations regarding Ayurvedic dietary interventions[39].

4.4. Case studies and success stories of Ayurvedic dietary interventions in cancer management

Ayurvedic dietary interventions have shown promise in cancer management. Ayurveda can be used in conjunction with chemotherapy or radiation therapy as an adjuvant or co-therapy, minimizing toxicities of these treatments[11]. Dietary interventions, such as intermittent fasting and ketogenic diets, have been shown to reduce cancer treatment toxicity and increase efficacy in preclinical studies[27]. Ayurvedic interventions with combined therapies have been found to reduce the cost of treatment, decrease relapse of disease, and decrease adverse events[20]. Case studies have demonstrated the effectiveness of

Ayurvedic and other holistic approaches in promoting the quality of life of cancer patients when combined with modern cancer care protocols[21]. However, there is a need for larger, randomized clinical trials to evaluate the efficacy of these dietary interventions in improving oncologic or quality of life outcomes for patients undergoing chemotherapy or radiotherapy[40].

CONCLUSION AND DISCUSSION

Ayurvedic dietary interventions emphasize the importance of *Agni*, the balance of *Doshas*, and the use of natural remedies to support overall health and well-being, which makes them a promising approach to managing cancer. Combining traditional cancer treatments with Ayurvedic principles may improve treatment outcomes and lessen side effects. In order to determine whether Ayurvedic dietary practices are effective in managing and preventing cancer, more investigation and clinical trials are required.

The ancient wisdom of Ayurveda provides valuable insights into the holistic approach to cancer care, focusing on personalized dietary recommendations, lifestyle modifications, and natural remedies. By understanding the underlying principles of Ayurveda, healthcare providers can offer more comprehensive and individualized care to cancer patients. Collaborative efforts between Ayurvedic practitioners and conventional oncologists can lead to a more integrated and patient-centered approach to cancer treatment. Continued research and education in Ayurvedic medicine are essential to harnessing its full potential in cancer management and improving patient outcomes.

Declaration

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Consent for publication: Not applicable.

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