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Tridosha Paradigm in Cancer pathogenesis: Integrating Ayurvedic Principles with Modern Oncology

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ABSTRACT

Whole medical systems typically rely on foundational texts and constitute comprehensive frameworks of theory and practice that have developed alongside biomedicine.^[1] *Ayurveda*, an ancient system of medicine, posits that health results from a balance of three fundamental energies, or *Doshas*: *Vata*, *Pitta*, and *Kapha*. Cancer remains a formidable challenge in modern medicine, characterized by uncontrolled cell growth and proliferation. While contemporary approaches focus on molecular and genetic mechanisms, traditional medical systems like *Ayurveda* offer holistic perspectives. In the human body, *Doshas* govern physiological and psychological functions, and their imbalance is considered pivotal in disease manifestation, including cancer. *Ayurvedic* principles emphasize personalized therapies aimed at restoring *Dosha* equilibrium through diet, lifestyle modifications, herbal remedies, and detoxification procedures. Integrating *Ayurvedic* insights with conventional cancer treatments holds promise for comprehensive patient care, potentially enhancing therapeutic outcomes and quality of life. The study aimed to establish the interface between cancer biology and *Ayurvedic* concepts, highlighting opportunities for synergistic approaches in combating this multifaceted disease. This paper explores the theoretical framework of *Ayurveda* and its potential implications for understanding the etiology, progression, and treatment of cancer (*Arbuda*). The three primary ancient texts are the *Charaka Samhita*, which focuses on the fundamental principles of *Ayurveda* and internal medicine,^[2] the *Sushruta Samhitas*, which cover surgical techniques and medical concepts,^[3] and the *Ashtanga Hridaya*, a condensed and poetic summary of the first two texts.^[4] Drawing from both ancient wisdom and modern scientific insights, this review synthesizes existing research to elucidate the interplay between cancer and the concept of *Tridosha*.

Key words: Cancer, Ayurveda, Arbuda, Tridosha.

INTRODUCTION

Cancer is a complex disease characterized by uncontrolled cell growth and proliferation, influenced by genetic, environmental, and lifestyle factors. *Ayurveda*, originating from ancient Indian texts like *Charaka Samhita* and *Sushruta Samhita*, conceptualizes

health as a balance of *Tridosha* - *Vata* (air and ether), *Pitta* (fire and water), and *Kapha* (water and earth). According to *Ayurvedic* principles, imbalance in *Tridosha* disrupts bodily harmony, leading to disease states. This paper examines the connections between cancer pathophysiology and *Ayurvedic* principles, aiming to bridge traditional wisdom with contemporary biomedical understanding. As of recent estimates, cancer prevalence rates vary significantly between different regions of the world, influenced by factors such as population demographics, healthcare access, and environmental exposures. Globally, cancer is a leading cause of morbidity and mortality, with millions of new cases diagnosed each year. In 2020, there were approximately 19.3 million new cancer cases and 10 million cancer-related deaths worldwide, according to the International Agency for Research on Cancer (IARC). The global burden of cancer continues to rise, driven by population growth, aging, and

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lifestyle changes. In India, cancer incidence and prevalence rates are also substantial. According to the National Cancer Registry Programme of India (NCRP), the estimated number of new cancer cases in India was around 1.39 million in 2020. The most common types of cancer in India include oral, lung, breast, cervical, and gastrointestinal cancers. Factors contributing to the high prevalence of cancer in India include population size, aging, tobacco use, environmental pollution, and a shift towards unhealthy diets and sedentary lifestyles. The prevalence rates of cancer in both the world and India underscore the importance of cancer prevention strategies, early detection, and access to quality treatment and care. Public health efforts aimed at reducing tobacco consumption, promoting healthy lifestyles, and increasing vaccination coverage (e.g., HPV vaccine for cervical cancer prevention), and improving healthcare infrastructure are crucial in mitigating the impact of cancer globally and in specific regions like India.^[5,6] Cancer pervasive disease characterized by abnormal cell growth and proliferation, remains a significant global health challenge. In parallel, *Ayurveda*, an ancient Indian medical system, offers a unique perspective on health and disease through its foundational concept of the *Tridosha* theory - *Vata*, *Pitta*, and *Kapha*. According to *Ayurveda*, these *Doshas* represent fundamental energies that govern physiological and psychological functions within the human body. Imbalances among these *Doshas* are believed to underlie various health conditions, including cancer. *Ayurvedic* principles emphasize a personalized approach to health maintenance and disease management, focusing on restoring *Dosha* balance through lifestyle modifications, dietary interventions, herbal therapies, and detoxification practices. Integrating *Ayurvedic* insights with modern oncological approaches presents opportunities for holistic cancer care, potentially enhancing treatment efficacy and patient well-being. This introduction sets the stage for exploring the intersection of cancer biology with *Ayurvedic* principles, highlighting avenues for collaborative research and therapeutic synergy in addressing this multifaceted disease.

Cancer

Cancer is a multifaceted disease characterized by the uncontrolled growth and spread of abnormal cells in the body. These cells can invade nearby tissues and organs, disrupting their normal function. The World Health Organization (WHO) defines cancer as a group of diseases that result from the abnormal and uncontrollable division of cells that can infiltrate and destroy normal tissues.^[7] Symptoms of cancer can vary widely depending on the type and location of the cancer, but common signs include persistent fatigue, unexplained weight loss, fever, pain, and changes in bowel or bladder habits. Other symptoms may include skin changes, such as the development of new moles or changes in existing moles, persistent cough or hoarseness, and unusual bleeding or discharge.

Early detection is crucial for effective treatment and improved outcomes. Diagnostic methods include imaging tests like X-rays and CT scans, laboratory tests such as blood tests and biopsies, and screening procedures like mammography and colonoscopy. Treatment options typically include surgery to remove tumors, chemotherapy to destroy cancer cells, radiation therapy to target cancerous tissues, and targeted therapies that interfere with specific molecules involved in cancer growth.

Types of cancer

Cancer manifests in various forms, each distinguished by its origin, growth patterns, and specific characteristics. Understanding the different types of cancer is crucial for accurate diagnosis, personalized treatment strategies, and prognosis. Here are some key types:^[8]

SN	Type	Origin	Example
1.	Carcinoma	These cancers originate from epithelial cells lining the surfaces of organs and tissues, both internal and external. They constitute the majority of cancer cases	Breast Cancer, Lung cancer, Prostate cancer, Colorectal Cancer

2.	Sarcoma	Sarcomas arise from connective tissues such as bone, muscle, cartilage, or fat. They are relatively rare compared to carcinomas but can occur anywhere in the body.	Osteosarcoma (bone cancer), rhabdomyosarcoma (muscle cancer), and liposarcoma (fat tissue cancer)
3.	Lymphoma	These cancers affect the lymphatic system, which includes lymph nodes, lymphatic vessels, and lymphoid organs like the spleen and thymus.	Hodgkin lymphoma and non-Hodgkin lymphoma
4.	Leukemia	Leukemias originate in the blood-forming tissues, primarily the bone marrow, leading to the production of abnormal white blood cells.	Acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL)
5.	Central Nervous system	They can arise from glial cells (gliomas), meninges (meningiomas), or nerve cells (neuroblastomas)	Glioblastoma, medulloblastoma
6.	Others	Various	Germ cell tumors (arising from reproductive cells), mesothelioma (affecting the lining of organs), and melanoma (a type of skin cancer).

In India, the prevalence rates of different types of cancer vary. Here are some common types of cancer along with their estimated prevalence rates in percentage:

SN	Cancer	Prevalence rate
1.	Lung cancer	6%
2.	Breast Cancer	14%

3.	Colorectal cancer	4%
4.	Oral cancer	11%
5.	Cervical cancer	11%
6.	Stomach Cancer	3%
7.	Prostate cancer	3%
8.	Liver cancer	3%

Understanding the diversity of cancer types is essential for healthcare providers to develop comprehensive treatment plans that consider the tumor’s location, stage, and individual patient factors. Advances in genomic research and personalized medicine continue to refine our approach to cancer diagnosis, prognosis, and therapeutic interventions, offering hope for improved outcomes and quality of life for cancer patients worldwide.

Arbuda

In ancient Indian literature and *Ayurvedic* texts, references to malignant diseases can be traced back to the *Atharva Veda* (circa 2200 B.C.). During this era, diseases akin to lymph node swellings were likely described under terms such as *Apachi* or *Apachit*. *Susruta*, in his seminal work *Sushrut Samhita* (circa 800 B.C.), detailed *Apachi* as multiple lymph node swellings appearing in regions like the neck, axilla, and groin. *Ayurvedic* texts extensively discuss *Arbuda*, described as a type of swelling, under the chapter on *Apachi*. *Susruta* characterized *Arbuda* as firm, fixed, slow-growing masses that are relatively painless and non-suppurative, resembling fleshy growths. The term *Arbuda* is linguistically derived from *Arb* (to destroy) with the suffix *Ena*, indicating fleshy outgrowths. In Vedic literature, *Arbuda* was metaphorically depicted as a serpent-like demon defeated by Lord *Indra*, while its literal meaning refers to a lump, mass, or polyp. These ancient insights into disease classifications and descriptions provide a foundational understanding of early medical perspectives on malignancies and their manifestations in *Ayurveda*.^[9] *Sushruta* identified trauma and irritation as triggers for soft-tissue tumors (*Mamsarbuda*) and diseases of the external genitalia

(*Sukaroga*), caused by irritants. Overconsumption of meat can vitiate muscle tissue (*Mamsa*), contributing to *Mamsarbuda*. He recommended local application of irritating medicines for genital enlargement, cautioning against their improper use to avoid *Mamsarbuda*. *Vagbhata* highlighted that excessive *Mamsa Dhatu* can lead to Tumors like *Galaganda*, *Gandamala*, *Granthi*, and *Adhimamsa*. *Ayurveda* also acknowledges genetic factors in conditions like familial polyposis coli (*Sahaja Arsha*), attributing them to defects in the ovum (*Sonita*) and sperm (*Shukra*).^[10] From the above description, the factors responsible for the development of tumors may be categorized under the following headings:

1. Unwholesome diet (*Mithya Ahara*)
2. Unwholesome regimen (*Mithya Vihara*)
3. Trauma (*Abhigata*)
4. Irritation
5. Genetic (*Anuvanshaja*)

The *Samprapti* (pathogenesis) of cancer in *Ayurveda* is attributed to various factors, including prolonged exposure to environmental toxins that provoke *Pitta* at the cellular level. This heightened *Pitta* can induce micro-inflammatory changes, disrupting the cellular *Agni* known as *Pilu Agni* and *Pithar Agni*. Impaired *Pilu Agni* leads to the formation of poorly developed tissue by *Pithar Agni*. In this process, the *Vata* is considered the active *Dosha* responsible for metastasis. *Kapha*, characterized by its heaviness, contributes to abnormal cell growth and the formation of malignant tumors. The *Tejas* component of *Pitta* enhances the metabolic activity of cancerous cells, which exhibit strong *Agni*. *Ayurveda* views cancer as a *Tridoshic* disorder where the interaction of abnormal *Vata*, *Pitta*, and *Kapha* facilitates its progression and spread. In other words, aggravating factors for each *dosha* according to *Ayurvedic* principles are as follows: *Vata* is exacerbated by excessive consumption of bitter, pungent, astringent, and dry foods, along with stressful conditions. *Pitta* is aggravated by overindulgence in sour, salty, and fried foods, as well as excessive anger. *Kapha* aggravation occurs with an excessive intake of

sweet and oily foods, coupled with a sedentary lifestyle. *Rakta* aggravating factors include the consumption of acidic or alkaline foods, fried and roasted foods, alcoholic beverages, and sour fruits, along with conditions like excessive anger, emotional distress, and exposure to intense sunlight or heat. *Mamsa* aggravation is caused by the excessive consumption of exudative foods such as meat, fish, yogurt, milk, and cream, as well as behaviours that promote exudation like daytime sleeping and overeating. Finally, *Medo* aggravation is linked to excessive intake of oily foods, sweets, and alcohol, combined with a lethargic attitude. These factors contribute to the imbalance of the respective doshas as outlined in *Ayurvedic* texts.^[10,11]

Tumors of the Head and Neck in Ayurveda

Name of the Tumor	Site	Dosa	Clinical Presentation	Prognosis
Tumors of the eyelid (<i>Vartmarbuda</i>)	Inner side of the eyelid	<i>Pitta</i> and <i>Rakta</i>	Irregular, knotty, reddish mass with mild pain	May be curable
Tumors of the ear (<i>Karnarbuda</i>)	External ear	Involvement of any one of the three dosas or in combination	Features based on the involved <i>Dosa</i>	May be curable
Tumors of the nose (<i>Nasa Arbuda</i>)	Nasal cavity	Involvement of any one of the three dosas or in combination	Features based on the involved <i>Dosa</i>	May be curable
Tumors of Lips (<i>Oshtarbuda</i>) Cystic growths of	Lips	<i>Vata</i> and <i>Kapha</i>	The growth appears like a water bubble	Fatal

lips (<i>Jalarbuda</i>)				
Ulcerated malignant growths of lips (<i>Raktarbuda</i>)	Lips	Rakta	Lips become red and swollen and discharge blood	Fatal
Tumors of the palate (<i>Talu Arbuda</i>)	Palate	Rakta	Swelling resembling the shape of the lotus	Fatal
Tumors of this oral cavity (<i>Mukharbuda</i>)	Inner surface of the mouth	Kapha	Pale, blackish mass that persists even after various surgical treatments	Fatal
Tumors of the throat (<i>Galarbuda</i>)	Root of the tongue or in the middle of the throat	-	Nonsuppurating, painless, hard, fixed and reddish tumor.	Incurable
Tumors of the head (<i>Shiro Arbuda</i>)	<i>Shiras</i>		General features of <i>Arbuda</i>	May be curable

DISCUSSION

According to the traditional *Samprapti* method, the participants provided an *Ayurvedic* view point on cancer pathophysiology that bridged modern and traditional concepts. *Ayurvedic* explanations of cancer causation focused on factors such as heredity, diet, and lifestyle, similar to biomedical perspectives. In biomedicine, genetic predisposition plays a critical role, and there are dietary factors linked to cancer risk, such as low-fat diets potentially reducing breast cancer recurrence and obesity being associated with endometrial cancer. *Ayurvedic* practitioners also recognize dietary influences, suggesting that diets high in *Kapha*-promoting (high-fat) foods may increase

cancer risk. Both *Ayurveda* and biomedicine acknowledge lifestyle-related factors in cancer development. For instance, studies have shown a link between night shift work and increased cancer incidence, a concept echoed in *Ayurveda's* emphasis on maintaining natural biorhythms for health. From a *Tridosha* perspective, *Ayurveda* views cancer as involving *Kapha* in stimulating tissue growth, *Pitta* in transforming normal tissue to malignant, and *Vata* in facilitating cancer spread beyond the primary organ (metastasis), aligning with modern understanding of cancer progression. Traditional *Ayurvedic* diagnoses such as *Granthi* and *Arbuda* were historically considered to have some relation to modern cancer concepts, but current data shows this connection to be limited. Some *Ayurvedic* practitioners suggested similarities between *Granthi* and *Arbuda* and cancer, although opinions varied among them. *Ayurvedic* principles highlight weakened *Dhatu*s (body tissues) and *Dhatu Agnis* (metabolic fire of tissues) as pivotal in cancer pathogenesis. According to *Ayurvedic* beliefs, weakened *Dhatu*s and compromised *Dhatu Agni* increase susceptibility to illness, particularly cancer affecting those specific tissues. This perspective is distinct to *Ayurveda*. Interestingly, in biomedicine, there is a concept akin to this known as field cancerization, where certain tissues (like those in the aerodigestive tract after tobacco use) are predisposed to cancer.

The *Ayurvedic* practitioners supported the efficacy of biological cancer therapies, advocating for their integration rather than as standalone treatments. This viewpoint aligns with research indicating that patients prefer integrated approaches over exclusive reliance on a single system. The practitioners noted that biomedical therapies may lead to degeneration, depletion, and inflammation, emphasizing the interconnectedness of bodily systems. This holistic perspective contrasts significantly with the conventional biomedical approach that focuses on individual organ systems.

Ayurvedic supportive care post-cancer treatment emphasizes restoring balance, enhancing mental and physical strength, and promoting rejuvenation, which

addresses the challenges often faced by cancer patients, including physical and psychological issues and reduced quality of life. Studies on *Ayurvedic Rasayanas*, traditionally known for promoting longevity, indicate potential benefits such as reducing chemotherapy toxicity and possibly regulating the immune system, offering a complementary approach akin to modern cancer immunotherapy efforts.

CONCLUSION

In Conclusion, *Ayurveda's Tridosha* framework provides a nuanced lens through which to view cancer, integrating ancient wisdom with contemporary biomedical knowledge. By exploring the interplay between cancer and *Tridosha*, this paper underscores the potential for synergistic approaches in cancer care, advocating for continued research and clinical exploration to optimize patient outcomes and quality of life.

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