Potential role of Ayurveda in integrative Oncology

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Abstract

Cancer is a life style disease with multi-factorial risk factors that can affect any part of the body. Surgery, radiotherapy and chemotherapy are the main modalities of treatment for cancer. These treatment modalities are practiced either alone or in combination depending upon the stage of cancer. In spite of the advances taking place day by day in each of these treatment modalities, the outcome of treatment remains unsatisfactory for several cancers either due to late detection (e.g. oral or breast cancer) or aggressive natural history (e.g. lung, liver or pancreatic cancer). Disease relapse and development of second primary cancers are the major challenges in the management of various cancers. Majority of these patients present with advanced stage and the morbidity following treatment is severe leading to poor quality of life among survivors. Alternative systems of medicine such as Ayurveda and Homeopathy have considerable potential in effectively supporting the management of cancer at various levels.

Introduction

Ayurveda, the Indian system of medicine practiced over 5000 years, considers disease and its management with a different approach. This system gives equal importance to prevention as well as for the treatment of diseases. As per Charak Samhitha, Ayurveda is described as not merely being a system of medicine, but a way life. Its objective is to accomplish physical, mental, social and spiritual well-being by adopting preventive and promotive approaches as well as treating disease with a holistic approach.¹ Definition of health as per Susrutha Samhitha is “He/she in whom, the doshas (body humour), agni (digestive powers), dhathus (tissues), malas (waste product) and their activities are normal, his/her soul, sense organs and mind are calm and clear, is called Swastha (healthy person).² Disease as per Ayurveda is mainly due to the derangement of equilibrium of thridoshas (vata, pitha & kapha) and treatment is nothing but bringing back the deranged doshas to equilibrium. The term dosha describes the three principles that govern the psycho physiological responses and pathological changes in the body. Cancer (arbuda) is described in ayurvedic classics as being large and round, immobile and deep seated tumour growing slowly; it is slightly painful but rarely suppurating. The clinical condition of cancer can also be correlated to the sannipatha state of all diseases, where
there is derangement of all *doshas*. *Sannipatha* diseases are usually malignant because all the three major body humours lose mutual coordination, resulting in a morbid condition. Several methods of management for these conditions by internal and external medications have been mentioned in Ayurveda. Integration of modern cancer treatment and ayurvedic system of medicine can improve the treatment outcome of cancer. This article reviews the various areas where integration can be made possible to improve the treatment outcome and quality of life of cancer patients.

**Identification of high-risk individuals to cancer using Ayurvedic concept of Prakruti**

An important concept of Ayurveda is that each individual is genetically different – this gives a person, a very specific constitution (*prakruthi*) and also an uniquely variable means of interacting with the environment. Health, according to Ayurveda, is equilibrium of three *doshas* and disease is nothing but distortion of this equilibrium. *Dosha* is something that can undergo decay or degeneration. In many healthy individuals, though equilibrium exists, there is predominance of one or two *doshas*, by birth, which though not a disease, makes the individual susceptible and at high-risk for diseases due to the predominance of that particular *dosha*. *Prakruthi* assessment can identify the *dosha* predominance in an individual and may potentially predict the increased probability of illness which may give opportunities for prevention and early detection of diseases in future.

This system of classifying individuals into groups not only predicts the probability, risk and susceptibility to disease but also facilitates promotion and maintenance of good health as well as appropriate choice of therapy and prognosis for a particular disease. This valuable method of physical assessment mentioned in Ayurveda can be utilized for identifying high-risk individuals prone to develop cancer. In a case control study, conducted at Regional Cancer Centre Trivandrum, involving invasive oral and breast cancer patients and apparently healthy control individuals, we observed that oral and breast cancer patients were more of *Vatha kapha prakruthi* compared to normal controls, who were mostly of *kapha pitha prakruthi*. *Vatha kapha prakruthi* individuals could be at high risk for various other epithelial cancers involving oropharynx, laryngopharynx, larynx, lung, oesophagus, stomach and large bowel; these individuals can be advised to abstain from certain habits and follow a healthy lifestyle recommended in Ayurvedic system of medicine. However, this observation needs scientific validation through properly designed studies such as cohort and case control studies.

The prognostic significance, if any, of the different *dosha* profiles such as *Vatha kapha prakruthi* and *kapha pitha prakruthi* can be studied by assessing treatment response and evaluating long term overall and disease-free survival, cure and quality of life in clinical observational studies (case series) of adequately treated cancer patients and randomized clinical trials involving different epithelial cancer patients.

**Role of Ayurveda in minimizing side effects of treatment**

Cancer chemotherapy, particularly with multiple drugs and as part of multimodality treatment, can cause excessive vomiting, gastritis, mucositis, negative nitrogen balance, anemia, neutropenia, thrombocytopenia, and
weight loss in patients. Ayurvedic preparations which contain *deepana* and *pachana* (which improves GI function) drugs such as dried ginger, pepper, *panchakola* powder, can be used along with the diet of the patients to control the symptoms. This will help to improve the health status of the patient during therapy and this will not affect the efficacy of chemotherapy. The ability of ginger in preventing chemotherapy induced nausea and vomiting has already been established. Neutropenia is another major problem in patients undergoing chemotherapy. This can lead to delays or discontinuation of the treatment regimen. There are ayurvedic preparations which can minimize these side effects. The myeloprotective effect of *Brahmarasayana* in patients undergoing radiotherapy with chemotherapy has been proven. In a clinical trial conducted by Joseph and associates, administration of *Brahmarasayana* to patients undergoing radiotherapy with chemotherapy accelerated the recovery of the haemopoetic system. There was a rapid rise in total leukocytes. Both lymphocytes and neutrophils were significantly increased by *Rasayana* treatment.

The commonly used ayurvedic rasyana drug *Aswagandha* (*Withania somnifera*) is found to have antioxidant, anti-inflammatory, anti-tumor, anti-angiogenic, immunomodulatory properties. An experimental study in animals by Davis and Kuttan has shown that *Aswagandha* is capable of reducing leucopenia induced by chemotherapeutic agents such as cyclophosphamide and paclitaxel. It also resulted in a greater than two-fold increase in bone marrow cellularity without interfering with the anti-tumour effect of the chemotherapeutic drugs. *Withania somnifera* has been shown to enhance the effectiveness of radiation therapy by increasing tumour regression, tumour growth delay and increasing survival time, while potentially mitigating undesirable side effects. These effects have been demonstrated in vitro on human cancer cell lines, but there have been no human trials to date. Given its broad spectrum of cytotoxic and tumor-sensitizing actions, *Withania somnifera* presents itself as a novel complementary therapy for integrative oncology care.

Radiotherapy to the head and neck region can lead to oral mucositis due to inflammation of mucous membrane within the treatment volume. Pelvic radiotherapy may lead to rectal mucositis, rectal ulceration and excessive discharge. Radiation induced mucositis is the dose limiting toxicity. Dryness of mouth is another side effect in patients undergoing radiotherapy for Head and Neck Cancer. Radiation to the salivary glands leads to reduction in the salivary flow and change in the intra oral pH. Saliva becomes more and more sticky and forms a thick coating over the mucous membrane leading to bacterial overgrowth. Mucositis can interfere with the patient’s ability to maintain adequate intake of food and liquids. Severe mucositis can lead to treatment interruptions or premature termination of therapy resulting in poor tumour control and survival. Several agents have been tried to minimize the severity of oral mucositis. But so far no method has been found to be effective.

In Ayurvedic texts there is description of a wide number of herbs and compounds for the maintenance of good oral hygiene. The clinical conditions seen in radiation induced mucositis can be correlated with that seen in a
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condition mentioned as mukhapaka, sarvasyaroga and in diseases caused by the vitiation of kapha pitha doshas inside the oral cavity. These compounds can be used to minimize the effects of radiotherapy in the oral cavity such as mucositis and dryness. A randomized controlled clinical trial using a herbal mouthwash, conducted at in patients undergoing radiation for oral cavity cancer at Regional Cancer Centre, Trivandum, demonstrated significant delay in the onset of mucositis (unpublished data). Good oral hygiene and reduced use of antibiotics and analgesics were also observed in patients using this herbal mouthwash compared to the control arm.

Plumbago rosea another drug commonly used in ayurvedic system of medicine is found to have radiosensitizing effect and can cause cytogenetic damage, more over studies show that plumbagin may be a good drug for use with radiation to enhance the tumor cell kill.\textsuperscript{21-23} Flavonoids orientin and vicenin isolated from the leaves of Indian plant Tulsi (Osimum sanctum) has radical scavenging activity and is found to have radioprotective effect in mice.\textsuperscript{24} Such scientifically proven herbal products could be tried along with radiotherapy to reduce the side effects and improve the treatment outcome.

Surgery plays an important role in the management of cancers. Radical surgery, especially after radiotherapy, may cause stiffness and limitations of the movements of joints and may interfere with nutrition. External application of herbal oils can be used to reduce surgical stiffness and muscular atrophy. The use of ayurvedic compounds in improving general health need to be explored in this context. Non –healing fistulas following surgery can be managed with topical application of ayurvedic compounds.

Randomized clinical trials are essential to establish the above aspects of ayurvedic treatments in cancer control and to develop safe and readily usable treatment algorithms.

Immunomodulation

Compromised immune status is reported in cancer patients. Ayurvedic texts contain a list of several compounds in improving immune status of cancer patients, these compounds can stop and reverse the carcinogenic process at the molecular level. Indian medicinal plants are a rich source of immunostimulants. There are a number of herbal compounds which can activate the immune system. Several in vitro studies revealed the immune modulation potential of indigenous compounds and herbs. Amla (Emblica officinalis), Shankhpuspi (Evolvulus alsinoides), Amrit (Tinospora cordifolia) are few among them.\textsuperscript{25-27}

The rasayanas mentioned in Ayurveda can be used in improving the immune system. Several in vitro studies using Brahma rasayana, Chyavanprasha, Aswagandha rasayana etc are encouraging.\textsuperscript{6, 28-30} These compounds can be used to improve the Quality of Life of patients undergoing cancer therapy.

However, proper scientific validation of these compounds is lacking. The pharmacological action of such drugs needs to be explored in a scientific way, particularly in randomized controlled clinical trials.

There is persistent immune suppression in patients with head and neck cancers who undergo primary therapy for cancer. Many studies have shown that the decreased T cell
count remained as such and never came back to normal levels even in patients who remain disease free following treatment.\textsuperscript{31-33} In a pilot study conducted at our cancer centre, administration of Varanadi ghritha to patients treated and cured of primary head and neck cancer resulted in an increase in CD3, CD19 and CD16 cells in the study subjects indicating an immunomodulatory effect of the study compound (unpublished data). The immunomodulatory effect of ayurvedic compounds could possibly prevent the occurrence of second primary tumors.

**Prevention of Recurrence / Relapse**

In Ayurveda, there are several drugs, which are mentioned for the management of cancer.\textsuperscript{34} These medicines are reported to bring down the relapse rate / occurrence of SPT in various types of cancers.\textsuperscript{35} Guggulu (Comminphora mukul) is used to treat internal tumours and malignant sores and ulcers since years. Notably, guggulsterone the major active component of the gum resin from Comminphora mukul was shown to induce apoptotic cell death and suppress proliferation, invasion, angiogenesis and metastasis of tumour cells.\textsuperscript{36} This may be due to the anti–tumour activity of indigenous drugs or due to the ability to improve the immune status of the patient. Herbs like Plumbago rosea, Semecarpus anacardium, which are proved in in vitro studies, having properties such as anti tumor promotion, inhibition of cell proliferation, induction of apoptosis, antioxidant and free radical scavenging activities, can be used in preventing second malignancies.\textsuperscript{21, 37}

However, well designed scientific studies are lacking.

**Improving Quality of Life**

The morbidities resulting from different treatment modalities make the cancer patient lead a poor of quality of life. Ayurvedic system, which aims at the physical and mental well-being of patients can have an important role in improving the quality of life of such patients. The adjuvant use of ayurvedic preparations after the main modality of treatment will help the patient to lead a better quality of life. The use of rasayana preparations also will help to improve the general health and immunity of the patients who had undergone chemotherapy and radiation. Brahmarasayana, Chyavanaprasha, Ashwagandha rasayana etc. and preparations like Indukantha ghritha on use as adjuvants will correct digestive disorders, reduce general weakness and improve the general immunity of the patients. Quality of Life (QOL) domains like levels of physical, social and psychological well – being of the patients who take ayurvedic preparations after main modality of treatment need to be compared with that of normal individuals. The improvement in QOL has to be validated scientifically using internationally accepted validated questionnaire.

**Chemoprevention**

Chemoprevention is defined as pharmacological intervention with specific nutrients or other chemicals to suppress or reverse carcinogenesis and to prevent the development of invasive cancer. Chemoprevention is targeted to modulate the promotion and proliferation phase of carcinogenesis by dietary intake of fruits and vegetables or by supplementation of pharmacological agents. The aim of a chemopreventive agent is to prevent or slow the carcinogenic process or to enhance
regression of the abnormal cells to normal.

Chemopreventive potential of several molecules such as curcumin (from turmeric), resveratrol (from red grapes and berries), genistein (from soy bean) and lycopene (from tomato) has been reported by Agarwal and associates.\textsuperscript{38} \textit{Ocimum sanctum}, (Tulsi) another commonly available plant is found to have chemopreventive potential by targeting the key proteins involved in the proliferation, invasion, angiogenesis and apoptosis.\textsuperscript{39} These molecules have to be subjected to clinical trials.

Palliative care

Cancer diagnosed in late stages requires palliation. Ayurveda has wide application in palliative care. Patients with advanced diseases often suffer from severe pain, non-healing ulcer, foul smelling fungating growth, cachexia and extreme tiredness. Use of poultice with preparations containing neem which has antibiotic properties, can be used to manage foul smelling fungating wounds to control infections. Herbal decoctions can be used to clean the wounds and dressing can be made with ayurvedic remedies. This can minimize the use of antibiotics. Similarly, external application of oils and hot fomentation or application of poultices can be tried to reduce the severity of pain, minimizing the use of analgesics and anti-inflammatory drugs. Ayurvedic medicines which can improve appetite, digestion and bowel movements can be used without causing much discomfort to the patient. Herbal food supplements can also be advised. Herbal diuretics, drugs which are used as liver tonics, haematnic, sedatives, etc can be used for managing palliative patients to improve food intake and general health leading to better quality of life.

Diet and Ayurveda

Ayurvedic treatment emphasize a great deal on the diet for patients. According to Ayurvedic principles, food is responsible for the development of an individual and for the appearance of the diseases. An unwholesome food results in the emergence of the disease. Several factors like quantity, time, preparation, nature of the disease and the condition of the patient can modify the effect of food. If food and drinks are ill chosen, ill prepared or ill served, the consequences will be harmful. A wholesome food is that maintains the balance of \textit{dhathus} and retrieves the balance after it has been disturbed. A patient having poor appetite may be advised to take a wholesome diet prepared with appetite improving additives such as dried ginger, pepper, \textit{pippali} (\textit{Piper longum}) \textit{saindhava} (KCL) etc. Proper advice regarding food intake according to the digestive power of the patient, clinical condition and \textit{Prakruthi} of the patient will improve health status of treated patients and can prevent disease recurrence to an extent. Many of the dietary ingredients such as turmeric (curcumin), pomegranate (ellagitanin) and grapes (reservertol) mentioned in ayurvedic text books are now well recognized to be good chemopreventive agents.\textsuperscript{40-42} Inclusion of similar food in the diet of patients and even normal individuals is advisable.

Conclusions

Ayurveda has a potentially important role to play in cancer prevention and control, encompassing the domains of preventive and clinical oncology involving risk reduction, health promotion, improving prognosis and
treatment response and long-term survival, preventing recurrence, minimizing treatment side effects, toxicity and adverse events. There are several potential compounds in Ayurveda which can be utilized in the above mentioned aspects of cancer control. However, these roles yet to be well defined, well accepted and well established due to lack of evaluation in well-designed observational and experimental studies with long term follow-up supported by appropriate statistical analysis. The potential roles of Ayurveda need scientific validation in rigorously conducted clinical research incorporating good clinical practice and appropriate research designs. Experienced practitioners of Indian system of medicine working hand-in-hand with clinical oncologists in conducting good quality preventive and clinical research could successfully integrate safe and effective Ayurvedic interventions in substantially increasing the preventive, therapeutic and safety profiles of modern cancer management. This may render cancer prevention and control a more affordable reality.

References

1659.
42. Zhou K, Raffoul JJ. Potential anticancer properties of grape
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antioxidants.  

*J Oncol* 2012;2012:803294.