



Ayurveda as an adjuvant therapy in cancer management

Afzal Nishat¹✉, Rani Mukesh², Sharma Sudhir Kumar³, Shukla Gyanendra Datta⁴

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Abstract

A review articles published in reputed journals of cancer suggests that patients under combined therapy (coordination of medical/radiation oncologist & surgeon) of cancer treatment experience adverse events included constitutional symptoms, gastrointestinal complications & pain. The most common reason for withdrawal was disease progression, followed by adverse effects. Complications during cancer treatment include- complications due to disease/ treatment & psychosocial problems. *Ayurvedic* formulations including single drugs like *Gvarras*, *Panchatulasiras* & combination drugs like *Rasayan Churna*, *Yastimadhu Ghrita* etc. have proven to be effective medicines when given in between consecutive chemo/radiation therapies. *Ayurvedic* interventions with combined therapies reduce cost of treatment with decrease in relapse of disease & decreased AEs.

Key words: *Cancer, Gvarras, Palliative therapy, Panchatulasiras, Rasayan Churna, Supportive therapy.*

Introduction

Sedentary and irregular life style, dietary factors, pollution, lack of exercise, industrialization and stress are most important factors responsible for many serious diseases & cancer being one of them. Description with similar characteristic to this disease is given under different context in *Ayurveda*. Vivid elaboration of these in texts shows that early *Ayurvedic* physicians had a good understanding of etiology & clinical manifestation of cancer. Cancer is on rise in India affecting most of the people. It is the most dreaded disease of the 20th century and affecting continuously with drastic increase of incidences in 21st century (Goel *et al.*, 2015). Chemotherapy, radiotherapy and surgery being the main line of treatments for cancer in modern science have its limits. Chemotherapeutic drugs which may be either cytotoxic or immunomodulatory are currently used for the treatment of an estimated 535,767 people dying of the disease in the year 2011. As per the latest estimates of Indian Council of Medical Research (ICMR), the prevalence of cancer in the country is about 27 lakh. The incidence of new cancer cases

every year in the country is about 11 lakh and about 5 lakh people die every year from the ailment (Balachandran and Govindarajan, 2005). Cancer is one of the distressing diseases globally and its death toll may be reduced by subsiding the side effects of chemotherapy and radiotherapy. Chemoprevention is a rapidly growing area of oncology which focuses towards the cancer prevention strategy of natural and synthetic interventions. Chemoprevention also deals with the chemotherapy of pre-cancer lesions which are called pre-invasive neoplasia, dysplasia or intraepithelial neoplasia depending on the organ system. Chemoprevention by synthetic agents can produce toxic side effects, which have limited their extensive use (Perboni *et al.*, 2008). *Ayurvedic* drugs works as a immunomodulatory and also helps in minimizing the side effects of chemotherapeutic drugs. Many *Ayurvedic* drugs have scientifically proven for their anticancerous activities e.g., *Tinospora cardifolia*, *Semicarpus anacardium*, *Piper longum*, *Andrographis paniculata*, *Phyllanthus niruri* (Arbabi *et al.*, 2012). This review study describes the anticancerous properties of single drugs and combination drugs and also when used with chemotherapeutics it not only reduces the side effects but also stimulates the immune response of the body. In the armory of modern medicine, the

Author's Address

^{1&2} Department of Sharir Rachana, Uttarakhand Ayurved University, Rishikul Campus, Haridwar-249401, Uttarakhand,
^{3&4} Department of Panchkarma, Uttarakhand Ayurved University, Motherhood Ayurvedic College, Roorkee- India.
E-mail: nooru.shufa26@gmail.com



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components of synthetic drugs or the medicinally accepted plants are evaluated for their efficacy against certain diseases thus forming a valuable source of therapeutic agents. Plants used against cancer lists more than 3000 species that have reportedly been used in the treatment of cancer (Debabrata *et al.*, 2011). Ayurvedic therapy used as decreasing the side effects of chemotherapy and radiotherapy and also helps to improve the condition of patient by inducing the immune system of the cancer patients.

This review study aims at compiling the evaluation of efficacy of the *Ayurvedic* drugs which is in practice used as adjuvants to the chemotherapeutic drugs.

Material and Method

This study is done by reviewing different classical texts of *Ayurveda* as well as various articles, journals, research papers and relevant sites.

Common chemotherapy side-effect in cancer patient and its *Ayurveda* based management:

Anorexia-

Nearly 80% of cancer patients develop anorexia-cachexia syndrome in advanced stage which is worsened further with the administration of chemotherapy (Julie *et al.*, 2012). Anorexia is most common side effect of chemotherapy and is associated with weight loss; fatigue and decreased appetite. To overcome this side effect *Ayurvedic* drug used as adjuvant drug. As per *Sharangdhar Samhita Lavangadi churna* is herbal preparation indicated in the patient of anorexia suffering from chronic illness (Alexander *et al.*, 2010).

Mucositis:

Oral mucositis is one of the common and serious complications of chemotherapy. Chemotherapy induced mucositis is highly painful condition without any definite cure; this condition is an important cause of poor quality of life in cancer patients receiving chemotherapy (Surendiran *et al.*, 2010). Recent scientific study showed that local application of *Yashtimadhu* powder (mixed with honey) in oral cavity, prior to radiotherapy, reduced radiotherapy induced mucositis (Sastri and Chaturvedi, 2011; Stanković *et al.*, 2010 and Stanković *et al.*, 2011).

Nausea and Vomiting:

They are the most common occurrence during Chemo-Radiotherapy. In spite of using anti-emetic drugs, 70% of patients show persistent symptoms. The treatment mentioned in *Ayurveda* as follows: Powder of *Haritaki* (*Terminalia chebula*) mixed with honey and *Jamun* (*Syzygium cumuni*) are all are indicated in Nausea and Vomiting (Renault *et al.*, 1999 and Stanković *et al.*, 2012).

Diarrhoea:

Fifty to eighty percent of patients receiving chemotherapy suffer from diarrhea which is contributor to poor quality of life and reduced treatment output. *Ayurvedic* treatment mentioned in *Charak Samhita* is Pepper powder with honey or butter milk with the powder of *chitraka* has potential to cure all kind of diarrheas (De Luca and Laflamme, 2001 and Uma, 2001).

Constipation: Constipation is another major problem in patients receiving specific chemotherapeutic agents such as Cisplatin. In *Ayurvedic* literature treatment of constipation is *Triphala* with warm water and ghee is considered as good remedy for constipation (Aruna and Sivaramakrishnan, 1990; Uma *et al.*, 2002 and Ganasoundari *et al.*, 1997).

Review list of some other *Ayurvedic* drugs which are useful in treatment of cancer-

Single drugs

Sadabahar (*Catharanthus roseus*):

Catharanthus roseus is a very important medicinal plant in this direction as availability and its property both are fortunate things for human being. *Catharanthus roseus* commonly known as the Madagascar periwinkle is a species of Apocyanaceae family. It is also known as *Sadabahar* means always "Bloom". The main active constituents in this herb are phenolic acid, flavonoids and alkaloids. These active constituents perform many protective functions and are involved in many anti-oxidative and anti-carcinogenic activities (Hidvegi *et al.*, 1999; Baral and Chattopadhyay, 2004 and Dhama *et al.*, 2013). In this many active constituents vincristine and vinblastine are the two alkaloids which are helpful to treat cancer. Vincristine and vinblastine both require aerial and root part of plant to be synthesized²¹. Methanolic



extract have cytotoxic activity and ethanolic, methanolic and aqueous extract of leaves, stem, root & aerial part of plant have anticancerous activity (Othman *et al.*, 2011; Ahmad *et al.*, 2008; Chen *et al.*, 2009; Karthikeyan *et al.*, 1999; Shi *et al.*, 2004).

Panchatulsi Ras:

Ocimum sanctum also known as "Holy basil" family Labiatae. Aruna and Sivaramkrishnan, based on their finding that the leaves of ocimum sanctum suppressed in benzo(a) pyrene induced chromosomal aberration in bone marrow and elevated glutathione and glutathione-s-transferase activities in liver of mice, suggested a possible role of plant in protecting against cancer. Ocimum leaf extract as well as their flavonoids orientin and vicenin have shown strong antioxidant activity in vitro, which strongly suggest free radical scavenging as a major mechanism by which ocimum product protect. The alkaloids of Ocimum sanctum such as eugenol, linolenic acid, rosmarinic acid, orientin and vicenin are effective against cancer like papillomas, breast cancer, liver cancer and fibrosarcoma (Kumar *et al.*, 2002 and Bhattacharjee and Sil, 2002).

Giloyras (Tinospora cordifolia):

Tinospora cordifolia belonging to the family menispermaceae, this is commonly known as *Guduchi or Giloy or Amrita*. The whole plant is used as rasayana or rejuvenating drug in *Ayurveda* to improve immune system of our body. Alkaloids like berberine, palmatine, tembaterine and magnoflorine isolated from the stem of T.cordifolia and shown effect on human cancerous cells. Out of the different alkaloids of T. cordifolia palmatine have anti-cancerous effect on melanoma cells, Dalton's lymphoma, leukemia, and skin & neck cancers.

Gvarras :

Fermented wheat germ extract (FWGE) is a multisubstance composition and contains 2-methoxy benzoquinone and 2,6 dimethoxy benzoquinone which are likely to exert most of its biological effects. FWGE interferes with anaerobic glycolysis, pentose cycle and ribonucleotide reductase pathways. It has significant anti-proliferative effect and kills tumor cells by the induction of apoptosis via the capase-polymerase

pathway. In addition FWGE modulates immune response by down regulation of MHC-1 and the induction of TNF-alpha and various interleukins. One of the nutrition supplements for cancer patients in current clinical use is FWGE which is available as an over the counter dietary supplements in several parts of the worlds under the brand name *avemar*. An anti-metastatic effect of FWGE alone or in combination with cytostatic drugs in a spleen-liver or muscle-lung mouse metastasis model using 3LL-HH, B16 and HCR-25 cell lines (Patel *et al.*, 2011 and Ishihara and Sakagami, 2003).

Neem (Azadirachta indica):

Neem tree has been used successfully to reduce tumor in *Ayurveda* from centuries. Recent studies indicated that an ethanolic extract of *neem* has been shown to cause cell death of prostate cancer cells by inducing apoptosis as evidenced by a dose-dependent increase in DNA fragmentation and a decrease in cell viability. *Neem* extracts have been shown to possess potent anti-cancerous properties against oral squamous cell carcinoma. *A. indica* also have cytoprotective effect of azadiradione from the ethanolic extract of seeds of this plant. Azadiradione exhibited potent antiulcer activity through the inhibition of H+K+-ATPase (proton pump) activity via its cytoprotective effect and also via antisecretory effect (Bhattacharya *et al.*, 2000).

Chitraka (Plumbago zeylanica):

Active constituent of plumbago, plumbagin was reported to act against P388 lymphocytic leukemia³⁷. Plumbagin also exhibits anticancer activity by inactivation of oncogenic transcription factors Forkhead Box M1 (FOXO1) signaling pathway in glioma cells. Plumbagin induce apoptosis in human pancreatic cancer cells primarily through the mitochondria related pathway followed by both capase-dependent and capase-independent cascades. It indicates that plumbagin can be potentially developed as a novel therapeutic agent against pancreatic cancer also.

Kalmegh (Andrographis paniculata):

It is used as a wonder drug in the traditional *Ayurvedic* system in Indian for multiple clinical applications. Andrographolide, a major constituent from the leaves of the andrographis, inhibited the proliferation of different tumor cell lines in various in-vitro studies. The compound exhibited direct



anti-cancer activity on cancer cells by cell cycle arrest (Wang *et al.*, 2002).

Haridra (Curcuma longa):

Curcumin sulphate a major constituent of *Curcuma longa* induces apoptosis in various cancer cells types including skin, colon, stomach, duodenum, and ovary (Wang and Su, 2001).

Bhumamlaki (Phyllanthus niruri):

Phyllanthus niruri has many effective traditional uses for a variety of diseases. Many studies revealed the preclinical pharmacological activity and therapeutic effects of Phytochemical isolated from *Phyllanthus niruri*. The species has demonstrated an antimutagenic and anticarcinogenic action, antitumor, antioxidant activity. Phytochemical studies have shown that extracts of genus *Phyllanthus* contain a variety of components, including gallic acid. Furthermore, studies have demonstrated cytotoxic activity of gallic acid on the human promyelocytic leukemia HL-60 cell lines (Wang *et al.*, 2002).

Combination of drug-

Rasayana churna:

Rasayan churna is a combination of three drugs: *Amlaki* (*Emblica officinalis*), *Guduchi* (*Tinospora cordifolia*), *Gokshura* (*Tribulus terrestris*) in same amount. *Emblica officinalis* have anti-mutagenic and antioxidant activity. The fresh or dried whole fruit of *P. emblica* is used in *Ayurveda* (Indian), Chinese, Tibetan traditional system of medicine as a powerful rejuvenator with anti-inflammatory effects and is widely consumed throughout india as a medicinal food. The fruit contains a series of diterpenes like gibberellins, triterpene lupeol, flavonoids, and polyphenols with potential immunomodulatory and antioxidant activities.

The data obtained from same dosage form of *Amalaki* prepared with different method shows that freeze-dried *Amalaki Rasayana* has weak anti-secretory and moderate anti-acid activity, whereas freeze-dried *Amalaki Churna* has marginal anti-secretory moderate anti-acid and weak anti-ulcer activity.⁵ *Tribulus terrestris* is the another constituent of *rasayana churna*, belonging to the family *Zygophyllaceae*. Phytochemical compounds present in *T. terrestris* are Saponins, alkaloids and flavonoids etc. Saponin present in *T. terrestris* can be used as inhibitory effect on breast cancer. Third

constituent of *rasayan churna* is *Tinospora cardifolia*, the anti-cancerous effects is also described in this study.

Noni Plus Tablets:

Noni i.e *Moringa cardifolia* family *Rubiaceae*. Its common name is Indian Mulberry. The different parts of *Noni* plants has been used (fruit, leaf, bark, flower, seed). There are more than 160 chemicals in *Noni*, the major component are scopolatin, octanoic acid, terpene compounds, alkaloids, anthraquinones, etc. It has been recently proved that *Noni* juice extract contained antioxidant, anticancerous, and inflammatory properties⁵⁸. An in-vitro experiment revealed that glycosides in *noni* fruit extract were responsible for the anticancerous activity. Anticancerous effect of *noni* extract, and or polysaccharide found in the ethanol precipitate has been tested against various cancer cell lines in vitro. Hirazumi first reported *Noni* fruit juice contains polysaccharides with antitumor activity that enhances the release of cytokines (INF-gamma) from thymocytes.

Yashtimadhughrit:

Glycyrrhiza glabra belongs to *Leguminaceae* family. It is also called as Indian Liquorice root. Liquorice (*Glycyrrhiza glabra*) was potential anticancerous agent. It indicated that liquorice and its derivatives may protect against carcinogen induced DNA damage. Glycyrrhetic acid was found to be an inhibitor of lipo-oxygenase and cyclo-oxygenase activities and it also inhibited protein kinase C, and down regulated the epidermal growth regulator factor. *Glycyrrhiza glabra* have a significant free radical quenching effect. Liquorice flavonoids have exceptionally strong antioxidant activity. *Glycyrrhiza glabra* extract has been used in herbal formulations for combating cancers like PC-SPEs, a polyherbal composition used on prostate cancer (Wang *et al.*, 2002).

Discussion

In this review study there are various *Ayurvedic* drugs have anti cancerous activity and used as an adjuvant therapy in cancerous treatment. We also deal with side effects of chemotherapy and its *Ayurveda* based management. Less or minimal effectiveness and toxic side effects of current cancer therapies draw the global attention towards



herbal medicine to arrest the insidious nature of disease. There are many single and combination of drugs which are reviewed in this study. In single drug therapy *Sadabahar* have both anti-oxidative and anti-carcinogenic properties and the main constituents in this medicinal plant are vincristine and vinblastine which have anti-cancerous properties. *Tulsiras* leaves extract have beneficial effect on human cancer. The leaves extract of *Ocimum sanctum* such as eugenol effective against cancer. In this study combination of drugs also effective in cancer treatment. In *Rasayana churna Amlaki* is the constituent and have anti-oxidative effect and effective on cancer treatment. *Ayurveda* plays an important complimentary role to western medicine in treatment of cancer. So *Ayurveda* used as an adjuvant therapy in cancer. Now a days *Noni* capsules are used as adjuvant drug in which *Noni* is main ingredient, and the alkaloids like scopolatin has anti-oxidant and anti-inflammatory properties. Ayurvedic drugs also have cytoprotective action so it is used as an adjuvant therapy in cancer patients.

Conclusion

Chemotherapy although a lifesaving modality for cancer is also a ruthless medical intervention compelling the patients to withdraw treatment before its completion. In UK, following a national audit of morbidity & mortality associated with chemotherapy, death within 30days of receiving chemotherapy is now an accepted standard. So, palliative or supportive care to cancer patients along with chemotherapy is a neo-concept on which work are being carried out. Neutraceuticals, herbal drugs or *Ayurvedic* herbomineral drugs have time to time proved as potent adjuvants to chemotherapy with minimizing its side effects & enhancing the quality of life.

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