

**Title:** Ayurvedic Herbs in Integrative Oncology

**Length of Time:** 60 minutes

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**Short Description:** Ayurvedic herbs are some of the most widely used herbal medicines in the world. Their widespread use and their wide-range of applications are based in rich history of effectiveness recorded in age old texts and commentaries. In this presentation, I will be discussing some of the most effective herbs for cancer-prevention and treatment. Citing historical data, Ayurvedic herbs readily became subjects of modern scientific experimentation. Affirming the faith of traditional practitioners, research has upheld many hypotheses of the ancient scientists. We have gained much genomic and microscopic knowledge with regards to patho-physiology of cancer and physiological effects of Ayurvedic herbs. Over the years, I have synthesized these streams of knowledge to discern the actions and applications of some of the most effective Ayurvedic herbs for integrative cancer-care. I will be discussing latest research on these herbs and herb drug interactions.

**Objectives:**

- History and principles of Ayurvedic cancer therapy
- Multi-modal approach to targeting vulnerabilities of tumor cells
- Discussion of versatile actions of Ayurvedic herbs applied towards cancer therapy
- Using herbs as adjunct to enhance efficacy of conventional therapy
- Herb-drug interaction
- Individualizing herbal prescription by patient's need

**Outline:** Includes Excerpts from my book *Ayurvedic Herbs: A Comprehensive Resource for Ayurvedic Healing Solutions*

**Withania somnifera, (Ashwagandha):**

“One of the most exciting of the possible uses of Ashwagandha is its capacity to fight cancers by reducing the size of tumors. Ashwagandha was evaluated for its anti-tumor effect in urethane induced lung tumors in adult male mice. Of the mice that were fed urethane, 100% developed cancer. Of the mice that were fed Ashwagandha along with the carcinogen, only 25% developed cancer... Research on animal cell cultures has shown that the herb decreases the levels of the nuclear factor kappaB, suppresses the intercellular tumor necrosis factor, and potentiates apoptotic signaling in cancerous cell lines... Withania somnifera reduces tumor cell proliferation while increasing overall animal survival time. Further, it has been shown to enhance the effectiveness of radiation therapy while potentially mitigating undesirable side-effects.”

### **Boswellia serrata, (Frankincense):**

“Boswellia extract has shown potential anti-carcinogen activity, inducing apoptosis in human cervical carcinoma cells. Boswellia increased the lifespan of mice with Ehrlich ascites carcinoma by 25%, and decreased S-180 tumors, also by 24%. Boswellic acids also inhibited the synthesis of DNA, RNA, and protein in human leukemia cells in a dose-dependent manner... In a randomized, placebo-controlled, double blind study in Germany, patients who were irradiated for brain tumors were given Boswellia serrata with great success in reducing brain swelling. 34 Patients often suffered from cerebral edema and usually are treated with dexamethasone, which has various side-effects. Forty-four patients with primary or secondary malignant cerebral tumors were assigned randomly to radiotherapy plus either Boswellia serrata (4200 mg/day) or a placebo. A reduction of cerebral edema of >75% was found in 60% of the patients receiving Boswellia serrata and in 26% of the patients receiving the placebo.”

### **Curcuma longa, (Turmeric):**

Curcuma has been the subject of extensive anti-cancer research. Several studies have investigated its impact on apoptosis, or programmed cell death. “Curcumin activates diverse anti-cancer activities that lead to inhibition of cancer cell and tumor growth, induction of apoptosis, and antiangiogenic responses.” Many studies report that the alkaloid curcumin inhibits apoptosis in human and rat T lymphocytes; whereas others have documented an induction of apoptosis in HL60 cancer cells, and in azoxymethane-induced colon tumors. One study “observed that curcumin inhibits Panc28 and L3.6pL pancreatic cancer cell and tumor growth in nude mice bearing L3.6pL cells as xenografts... Despite the use of surgical resection and aggressive chemotherapy, nearly 50% of patients with colorectal carcinoma develop recurrent disease, highlighting the need for improved therapies. Curcumin (diferuloylmethane) has shown to inhibit the growth of transformed cells and colon carcinogenesis at the initiation, promotion, and progression stages in carcinogen-induced rodent models.”

Curcumin has demonstrated positive therapeutic effects in Phase I and Phase II clinical trials. Thus, gaining in its reputation as an anti-cancer agent.

### **Azadirachta indica, (Neem):**

Neem is quiet under-appreciated for its anti-tumor activity. This herb is better known for its hypoglycemic and anti-microbial activity. However, it has been subjected to rigorous studies in cases of cancer. “Neem leaf preparation (NLP) was found to activate natural killer (NK) cells (CD56(+)/CD3(-)) to enhance their cytotoxic ability towards tumor cells and stimulate the release of interleukin-12 (IL-12) from macrophages of healthy individuals and head-and-neck squamous cell carcinoma patients... A study was carried out to investigate the ability of Neem leaf preparation (NLP) to protect against apoptosis of circulating blood cells induced by cisplatin and 5-fluorouracil (cis + 5-FU)... In comparison to the untreated control, during cis + 5-FU therapy, significant downregulation of leukocyte apoptosis was noted in mice that had been pre-treated with NLP.”

These studies and many more highlight the chemo-preventive and chemo-enhancing activities of Neem.

### **Tinospora cordifolia, (Guduchi):**

Guduchi is a very useful immune-modulator herb. Researchers have looked at many aspects of its activities in cancer care. It has been shown to enhance immune function demonstrated by increase in antibody titers and elevation in macrophage activation. Guduchi has also been shown to reduce solid tumors by 83% when applied synergistically with cyclophosphamide in animal models. This herb has also been tested successful for improving survival among ehrlich ascites carcinoma bearing mice. When tested at various stages of cancer, Guduchi was observed to slow down cancer progression at stages I, II, and III. Anti-metastatic activity has been demonstrated through the administration of polysaccharides of Guduchi against melanoma cells. Tinospora extract blocks angiogenesis as a major part of its anti-metastatic activity.

### **Amoora rohituka (Ruhtaka):**

This Ayurvedic herb is primarily known as an anti-microbial herb. This plant is also a useful anti-inflammatory and anti-cancer herb. Triterpenoids isolated from the herb have demonstrated cytotoxic activity against human lung cancer and human liver cancer cells. Extract of the whole herb has demonstrated cytotoxic activity against breast cancer and pancreatic cancer cell lines. Amooranin, a triterpene acid from Ruhtaka, was observed to have 40-70% apoptosis by activation of caspase-8 pathway. In another experimental model, Amooranin demonstrated the capacity of overcome multi-drug resistance in human leukemia and colon carcinoma cell lines. This compound exerts this cytotoxic effect by directly arresting cell cycle from moving into mitotic phase; thus, inhibiting cell division among cancer cells.

### **Triphala:**

Triphala, a combination of fruit powder of three different plants: *Terminalia chebula*, *Terminalia bellerica*, and *Embllica officinalis*, showed cancer chemopreventive potential. Triphala administered in the diet significantly reduced the benzo(a)pyrene induced fore-stomach papillomagenesis in mice. In the short-term treatment groups, the tumor incidence was lowered to 77.77% by 2.5% and 5% of the Triphala mixed diet along with lowered tumor burden.

### **Andrographis paniculata (Kalmegh):**

The anti-cancer potential of *Andrographis paniculata* has been studied in number of cell line and animal studies. 20 patients with stage IV, end-stage cancer, one bladder, five breast, two prostate, one neuroblastoma, two non-small cell lung, three colon, one mesothelioma, two lymphoma, one ovarian, one gastric, and one osteosarcoma. These patients were treated with: Transfer Factor Plus, 3 tablets 3 times per day, IMU Plus (non-denatured milk whey protein, 40 gm/day); intravenous (50–100 gm/day) and oral (1–2 gm/day) ascorbic acid; *Agaricus Blazeii* Murill teas (10 gm/day); immune modulator mix combination of vitamins, minerals, antioxidants, and immune-enhancing soy extract and *Andrographis paniculata* (500 mg twice daily). After 6 months, 16 of the 20 patients were still alive. The 16 survivors had significantly higher NK

function than baseline ( $p < .01$  for each) and decreased TNF alpha; quality of life improved for all survivors by SF-36 form evaluation. Regression in solid tumor development was observed when cyclophosphamide- and radiation-exposed animals were treated with the extract of *Andrographis* in combination with whole-body hyperthermia.

***Nigella sativa* (Kalonji):**

Thymoquinone a primary active component of *Nigella* is known as inhibitor of oxidative stress. Compared to a chemotherapeutic drug of choice, *Nigella* has demonstrated remarkable chemotherapeutic responses. A study was conducted to evaluate and compare the effects of *Nigella* extracts on colon cancer cells. Cell viability, cell number, cellular morphology, and cellular metabolism were compared for the control and treatment groups. The results evidenced a significant decrease in the numbers of cancer cells in the groups treated with the extract, comparable to the chemotherapeutic agents. Researchers at the Kimmel Cancer Center in Philadelphia found that thymoquinone blocked pancreatic cancer cell growth and killed the cells by enhancing the process of programmed cell death, or apoptosis. These findings suggest that thymoquinone could be used as a preventative strategy in patients who have been through surgery and chemotherapy or in individuals at high risk of developing cancer. Studies have attempted to elucidate the molecular targets by which *Nigella* exerts its anti-cancerous activity. Thymoquinone downregulated MUC4 expression through the proteasomal pathway and induced apoptosis in pancreatic cancer cells by the activation of c-Jun NH(2)-terminal kinase and p38 mitogen-activated protein kinase pathways.