

Review Article

Holistic approach towards prevention of cancer

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ABSTRACT:

The rising prevalence of chronic diseases world-wide and the corresponding rise in health care costs is propelling interest among researchers and the public for these food related items for multiple health benefits, including a reduction in cancer risk and modification of tumor behavior. According to Ayurved cancer is swelling at different places in body and it correlate with *Arbuda* and *Asadhya vrana*. Cancer is a major burden of disease worldwide not only in developed countries, but also in developing countries. Cancer is not curative but it can be preventive and symptoms of cancer and chemotherapy can be prevented by following *Ayurvedic* disciplines. Many cancers can be prevented by not smoking only but maintaining a healthy weight, not drinking too much alcohol, eating plenty of vegetables, fruits and whole grains, vaccination against certain infectious diseases, not eating too much processed and red meat and avoiding too much sunlight exposure. Importance of spices has been already explained in our ancient *Ayurvedic* samhita. Today, spices are increasingly appreciated not only for their culinary properties but also for their potential health benefits. In other cases, the biological effects of spices may arise from their ability to modulate a number of cellular processes, including those involved with drug metabolism, cell division, apoptosis, differentiation, and immune competence. This article focuses on the anti-microbial, antioxidant, and anti-tumorigenic properties of herbs and spices as well as lifestyle modifications influence carcinogen bio-activation, and likely anticancer contributions.

KEY WORDS: Cancer, spices, *Arbuda & Asadhya Vrana*, Carcinogen

INTRODUCTION:

The identification and differentiation of malignant diseases have been enlightened much later than the description available in ancient Indian literature. Earliest and foremost record could be seen in *Atharva veda*, where the disease was nomenclature as "APACIT". In the later swelling at different places in the body. It does not mean that ancient Indian clinicians were unaware about the malignant diseases. They presented their views regarding cancer as a swelling superficially or situated in the deeper structure or sometimes as chronic ulcers. Such swellings or lumps as chronic ulcers. Such swellings or lumps have been categorized under the heading of "*Arbuda*", where as non-leading ulcer as "*Asadhya vrana*".

Cancer is a group of diseases involving abnormal cell growth with the potential to spread to other parts of the body. These contrast with benign tumors, which do not spread to other parts of the body. Possible signs and symptoms include a lump, abnormal bleeding, prolonged cough, unexplained weight loss and a change in bowel movements. While these symptoms may indicate cancer, they may have other causes. Over 100 types of cancers affect humans.

Today, claims about the ability of foods, including spices, to lower disease risk or to enhance the quality of life. Three types of biomarkers - exposure, effect, and susceptibility - are needed to evaluate the effects of spices in cancer prevention and therapy. Many

ethnic cuisines are recognized for their herbs and spices. Turmeric in Indian cuisine; basil, garlic, and oregano in Italian and Greek cuisines; and lemongrass, ginger, cilantro, and chili peppers in Thai food represent some of the cultural diversity in the use of herbs and spices. The cuisines of Asia, South-East Asia, and the Mediterranean are perceived by many to be healthier than the typical Western diet. Archeologists discovered evidence that as early as 50,000 B.C. humans used the leaves of plants for flavoring meats and around 2300 B.C. for wine making. However, Alexander the Great's campaigns in Central Asia around 330 B.C. are often credited for introducing Asian, Persian, Indian, and Greek cultures and ideas, thus facilitating the dissemination and adoption of herbs and spices among many cultures. Early records indicate that herbs and spices were used as medicinals in ancient Egypt and Assyria and as food preservatives in ancient Rome and Greece. Herbs and spices continued to be used during the Middle Ages for flavoring, food preservation, and medicinal purposes.

Spices may be a key to determining the balance between pro- and anticancer factors that regulate risk and tumor behavior. About 75% of U.S. households use dietary approaches to reduce their risk of diseases, including cancer. Americans between the ages of 36 and 55 are increasingly interested in adopting healthy eating behaviors and are gravitating toward ethnic cuisines based on perceived health benefits. Many of these ethnic foods are loaded with unique and flavorful spices. Between 1970 and 2005, the overall per capita consumption of spices in the United States doubled, increasing from about 1.6 to 3.3 pounds per year. As expected, the consumption of some spices increased far more than others; for example, garlic consumption increased more than sixfold. Several spices are effective antioxidants, they may be particularly important in decreasing oxidative damage due to environmental stress, including excess calorie intake.

CAUSES OF CANCER

Tobacco use is the cause of about 22% of cancer deaths. Another 10% are due to obesity, poor diet, lack of physical activity or excessive drinking of alcohol. Other factors include certain infections, exposure to ionizing radiation and environmental pollutants. In the developing world, 15% of cancers are due to infections such as *Helicobacter pylori*, hepatitis B, hepatitis C, human papillomavirus infection, Epstein-Barr

virus and human immunodeficiency virus (HIV). These factors act, at least partly, by changing the genes of a cell. Typically, many genetic changes are required before cancer develops. Approximately 5–10% of cancers are due to inherited genetic defects from a person's parents. Cancer can be detected by certain signs and symptoms or screening tests. It is then typically further investigated by medical imaging and confirmed by biopsy.

NEED OF PREVENTION?

In 2015, about 90.5 million people had cancer. About 14.1 million new cases occur a year (not including skin cancer other than melanoma). It caused about 8.8 million deaths (15.7% of deaths). The most common types of cancer in males are lung cancer, prostate cancer, colorectal cancer and stomach cancer. In females, the most common types are breast cancer, colorectal cancer, lung cancer and cervical cancer. In 2012, about 165,000 children under 15 years of age were diagnosed with cancer. The risk of cancer increases significantly with age, and many cancers occur more commonly in developed countries. Rates are increasing as more people live to an old age and as lifestyle changes occur in the developing world.

In 2008, approximately 12.7 million cancers were diagnosed (excluding non-melanoma skin cancers and other non-invasive cancers) and in 2010 nearly 7.98 million people died. Cancers account for approximately 13% of deaths. The most common are lung cancer (1.4 million deaths), stomach cancer (740,000), liver cancer (700,000), colorectal cancer (610,000) and breast cancer (460,000). This makes invasive cancer the leading cause of death in the developed world and the second leading in the developing world. Over half of cases occur in the developing world.

Deaths from cancer were 5.8 million in 1990. Deaths have been increasing primarily due to longer lifespans and lifestyle changes in the developing world. The most significant risk factor for developing cancer is age. Although it is possible for cancer to strike at any age, most patients with invasive cancer are over 65. Aging's effect on cancer is complicated by factors such as DNA damage and inflammation promoting it and factors such as vascular aging and endocrine changes inhibiting it.

Spices & herbs contains multiple active principles that often operate synergistically producing

producing therapeutic benefits and lowering the risks of adverse effects; and avoids the need for supplemental therapy to manage cancer. Now it is important to raise awareness and encourage implementation of *Ayurvedic* principles for preventing cancer and suggest an integrated approach in tumor management and treatment. There are some spices which helps in prevention of cancer and side effects of chemotherapy.

1. BASIL [TULASI]

Bioactive compound- Eugenol, apigenin, limonene, ursolic acid, methyl cinnamate, 1,8-cineole, α -terpinene, anthocyanins, β -sitosterol, carvacrol, citronellol, farnesol, geraniol, kaempferol, menthol, *p*-coumaric acid, quercetin, rosmarinic acid, rutin, safrole, tannin, catechin,

- The essential oil of basil possesses antimicrobial properties investigated the effect of basil on *Helicobacter pylori* and found that methanol, butanol, and n-hexane fractions of basil demonstrated antagonistic activity against the bacteria.
- The effects of balsamic vinegar-enriched extracts from several herbs (rosemary, sage, and basil) in soups and salads on oxidative stress and quality of life measures in women with stage IIIB and IV breast cancer.
- Several studies provide evidence that basil is an antimutagenic spice.
- There is evidence that basil can decrease DMBA-induced carcinogenesis.
- The anticancer properties of basil may also relate to its ability to influence viral infections. Individuals with hepatitis B are recognized to be at increased risk for hepatocellular carcinoma.

2. CARAWAY [KARWAI]

Bioactive compound- Carvone, limonene, α -pinene, kaempferol

- Although caraway appears to be a potent antioxidant in vitro, it has not been adequately examined in humans.
- Caraway oil and its ethanol oleoresin showed better reductive power than the other oleoresins.
- The effect of caraway seed extract on mutagenesis.
- Recently research has been done to explore the anticancer potential of caraway in sites ranging from colon to skin cancers. The number of carcinomas in those animals provided with

caraway oil were significantly less than in the controls

- Caraway may also influence carcinogen activation by its ability to modify carcinogen bioactivation. Overall, the ability of caraway and its active constituent to lower chemically induced cancers.

3. CARDAMOM [ELAICHI]

Bioactive compound- Limonene, caffeic acid

- Cardamom is a common ingredient used in Indian cooking.
- As with many spices, cardamom has been demonstrated to have antioxidant properties.
- The ability of cardamom to inhibit chemical carcinogenesis.
- These observations suggest that intake of cardamom oil affects the enzymes associated with xenobiotic metabolism and may therefore have benefits as a deterrent to cancer.
- Cardamom has also been demonstrated to decrease azoxymethane-induced colon carcinogenesis by virtue of its anti-inflammatory, antiproliferative, and proapoptotic activities.
- Recently, cardamom aqueous extracts were reported to significantly enhance splenocyte proliferation in a dose-dependent manner, especially when combined with black pepper. While the effects of cardamom and black pepper were the opposite on T helper-1 and -2 cytokine release by splenocytes, the presence of both spices significantly enhanced the cytotoxic activity of natural killer cells against YAC-1 lymphoma cells. These findings provide evidence that cardamom may have anticancer benefits by modifying immunocompetence.

4. CINNAMON [DALCHINI]

Bioactive compound- Cinnamic aldehyde, 2-hydroxycinnamaldehyde, eugenol

- Several studies have examined its antioxidant properties.
- cinnamon bark powder significantly increased several antioxidant-related enzymes, including catalase, superoxide dismutase, and GST in both liver and heart tissue, These enzymes help maintain GSH levels, essential for cellular integrity and protection against oxidative damage from free radicals (Dhuley 1999).
- The ability of cinnamon extracts to suppress the in

vitro growth of *H. pylori*, a recognized risk factor for gastric cancer, gastric mucosa-associated lymphoid tissue lymphoma, and possibly pancreatic cancer, has stirred considerable interest in the potential use of this spice to suppress human cancers.

5. CORIANDER [KOTHIMBIR]

Bioactive compound- Quercetin, caffeic acid, cineole, geraniol, borneol, 1,8-cineole, α -terpinene, β -carotene, β -pinene, β -sitosterol, cinnamic acid, ferulic acid, γ -terpinene, kaempferol, limonene, myrcene, *p*-coumaric acid, *p*-cymene, quercetin, rutin, vanillic acid

- Although all parts of the plant are edible, its fresh leaves and dried seeds are most frequently used in cooking. Coriander is a common ingredient in many foods throughout the world. One of its principal constituents is linalool.
- Several animal studies provide evidence that coriander seeds can promote the hepatic antioxidant system.
- Although relatively few studies focus on coriander for its anticancer properties, those that are available suggest coriander may be important.

6. CUMIN [JIRE]

Bioactive compound- α -pinene, β -pinene, γ -terpinene, *p*-cymene, cuminaldehyde, carvone, 1,8-cineole, β -carotene, β -sitosterol, caffeic acid, carvacrol, carvaol, geraniol, kaempferol, limonene, *p*-coumaric acid, quercetin, tannin, thymol

- Thymoquinone (TQ) is the most abundant component of black cumin seed oil.
- TQ has been reported to exhibit antioxidant, antimicrobial, anti-inflammatory, and chemopreventive properties and to ameliorate B(a)P-induced carcinogenesis in the forestomach. Considerable evidence points to the ability of TQ to suppress tumor cell proliferation, including colorectal carcinoma, breast adenocarcinoma, osteosarcoma, ovarian carcinoma, myeloblastic leukemia, and pancreatic carcinoma.

7. DILL [SHEPU]

Bioactive compound- Carvone, limonene, isorhamnetin, kaempferol, myricetin, quercetin, catechin

- Dill is an herb that in effect has two components

that are dependent on the seasons. In the early spring, dill is used for its leaves and in the autumn for its seeds. The principal constituents of dill weed oil are anethofuran or 3,6-dimethyl-2,3,3a,4,5,7a-hydroxobenzofuran, and carvone or *p*-mentha-1,8-dien-2-one.

- Dill promotes drug detoxification mechanisms.
- It is particularly helpful in detoxifying foreign compounds, including carcinogens.

8. GARLIC [LASUN]

Bioactive compound- Allicin, diallyl disulfide, allyl isothiocyanate

- Garlic has been used throughout history for both its culinary and medicinal properties. It may contribute to several dietary factors with potential health benefits, including the presence of oligosaccharides, arginine-rich proteins and, depending on soil and growing conditions, selenium and flavonoids.
- Preclinical models provide evidence that garlic and its associated components can lower the incidence of breast, colon, skin, uterine, esophagus, and lung cancers. The ability of garlic to inhibit tumors due to different cancer-inducing agents and in different tissues indicates that a generalized cellular event is likely responsible for the change in tumor incidence and that the response is highly dependent on environmental or other types of biological insults. Because metabolic activation is required for many of these carcinogens, there is likelihood that either phase I or II enzymes are altered.
- However, it was effective in decreasing prostate cancer multiplicity in the transgenic adenocarcinoma of the mouse prostate model, it did not appear to relate to a change in angiogenesis.

9. SAFFRON [KESAR]

Bioactive compound- Crocetin, crocin, β -carotene, safranal, all trans retinoic acid

- Aqueous saffron preparations have been reported to inhibit chemically induced skin carcinogenesis. Both changes in carcinogen bioactivation and tumor proliferation appear to occur.
- Saffron and crocus also have significant antitumorigenic properties. Similar to other spices, they appear to suppress cell growth in neoplastic cells to a greater extent than in normal cells.
- The effects of tumor suppression also have an impact on the longevity of the host. A significant

increase in the life span of Dalton's lymphoma-bearing animals was found in those provided with saffron.

10. GINGER [AADRAK]

Bioactive compound- Zingiberone, zingiberene, ingerol, paradol, curcumin, shagoal

- Ginger is consumed widely not only as a spice but also as a medicinal agent.
- Gingerol has also been shown to decrease intracellular ROS formation in human keratinocyte cells, inhibit angiogenesis in human ECs.
- Inflammation is a significant risk factor for cancer, including prostate cancer. Ginger also appears to have antitumorigenic properties. Several cell lines have been examined for their sensitivity to ginger.
- Ginger is also recognized for its potential usefulness to reduce nausea. To determine whether ginger had antiemetic effects some research studies were under gone. Then final conclusion drawn as, Ginger was determined to be as effective as metoclopramide, but neither was as effective as ondansetron.
- So it can be effective in nausea induced due to chemotherapy.

11. ROSEMERRY [ROSEMERI]

Bioactive compound- Carnosol, carnosic acid, cineole, geraniol, α -pinene, β -carotene, apigenin, limonene, naringin, luteolin, caffeic acid, rosmarinic acid, rosmanol, vanillic acid

- Due to its high antioxidant activity, crude and refined extracts of rosemary are now widely available commercially.
- While the data are difficult to interpret, when rosemary is added along with other herbs to a balsamic vinegar preparation used in soups and salads, it appears to provide protection against oxidative stress in humans.
- Considerable evidence also suggests that rosemary extracts, or its isolated components, can retard chemically induced cancers.
- Rosemary extracts and the active compounds carnosic acid and rosmarinic acid have been found to inhibit the proliferation of various human cancer cell lines.
- It also act as a antitumorigenic.
- Carnosol, and possibly other constituents in rosemary, may block the terminal apoptotic events induced by some chemotherapeutic drugs and

therefore may decrease the effectiveness of some standard therapies for leukemia.

SOME AYURVEDIC ANTICANCER DRUGS AND THEIR PROPERTIES

• *ANDROGRAPHIS PANICULATA-*

beneficial against tumourigenesis by their anti-lipoperoxidative action and by enhanced carcinogen detoxification action

• *PHYLLANTHUS NIRURI/AMARUS-*

An aqueous extract of P. amarus increases the life span of the tumour bearing rats and normalizes-glutamyl transpeptidase activity. It plays a major role in disruption of HBsAg mRNA transcription and post-transcription which could be beneficial against viral carcinogenesis

• *PIPER LONGUM-*

used as an ingredient of *Ayurvedic* anticancer formulations because of its anti-oxidative potency in both in vitro and in vivo conditions

• *PODOPHYLLUM HEXANDRUM LINN-*

It is a powerful anticancer drug against various cancers. Podophyllin and its active principle, podophyllotoxin are known for their cytotoxic effect by virtue of their properties of mitotic inhibition, nuclear fragmentation, impaired spindle formation and they are also found to be karyoplastic.

• *TINOSPORA CORDIFOLIA -*

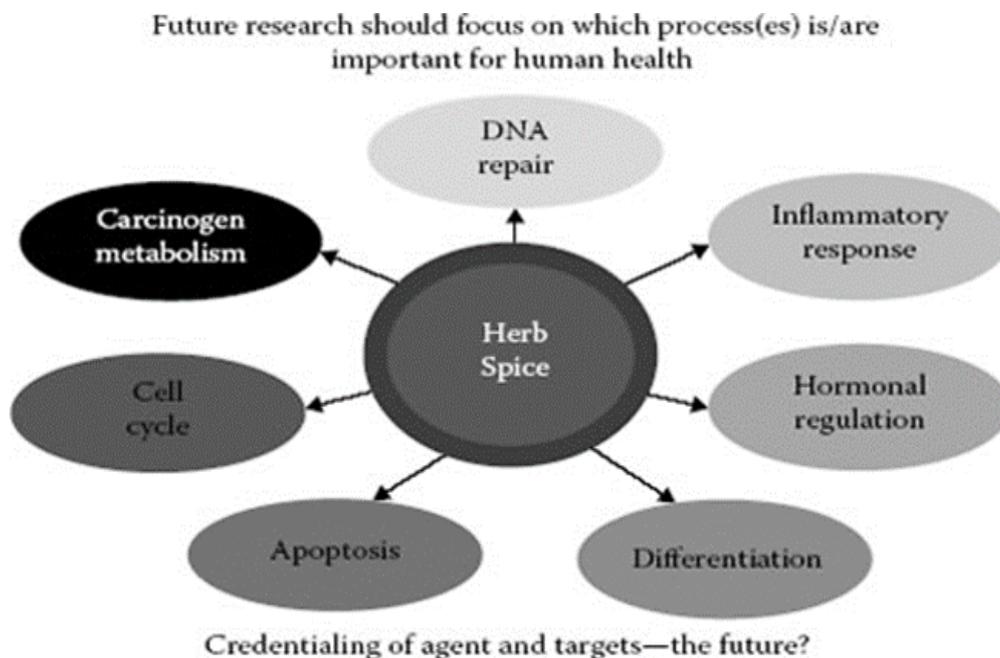
The active principles from T. cordifolia enhance host immune system by increasing immunoglobulin and blood leukocyte levels and by the stimulation of stem cell proliferation. It has the ability to reduce solid tumour volume by 58.8%, which is comparable to cyclophosphamide, a known chemotherapeutic agent.

• *SEMECARPUS ANACARDIUM-*

It also corrects hypoglycaemia and controls abnormal lipid peroxidation by the maintenance of antioxidant defense status. In the microsomes, it acts as a bifunctional inducer of both phase I and II biotransformation enzymes and prevents tumour initiation by preventing carcinogen activation.

MECHANISM OF ACTION

Spices have chemical composition which helps to bind the free radical electron. It result's into free radical scavenging effect, cell cycle repair, DNA repair.



LIFESTYLE CHANGES ALSO PLAYS IMPORTANT ROLE IN PREVENTION OF CANCER:-

AVOID SMOKING AND EXPOSURE TO SMOKE

In ayurveda nidhan parivarjan is first line of treatment in all diseases. So quite smoking will help to prevent the cancer. Smoking is the most significant cancer risk factor we can control. It is responsible for not only lung cancer but many other types of non-pulmonary cancer. Even if you don't smoke, avoiding secondhand smoke is key to reducing risk. If someone is bothering you with their smoke, don't sit quietly back and tolerate it. Either move or ask them to put it out.

DAILY EXERCISE

When you exercise, you are not only making yourself healthier, you are decreasing your risk of certain types of cancers as well. The American Institute for Cancer Research currently recommends that everyone exercise for at least 30 minutes per day. Moderate exercise, by contrast, will not only improve your cardiovascular health, but it is believed to cut the risk of colon cancer by as much as 40 percent, too. Even for those who have already had cancer, exercise can make a big difference in preventing recurrence.

BY EATING FRESH FRUITS & VEGETABLES

Fruits and vegetables contain antioxidants which help repair damaged cells. Of these, cruciferous vegetables and berries pack an extra punch with a multitude of vitamins, fiber, and disease-fighting phytochemicals. In addition to berries, top choices include broccoli, kale, cabbage, radishes, and rutabaga. There are even a number of superfoods known to reduce cancer risk in people who previously smoked as well as those who have been exposed to secondhand smoke.

BY LIMITING RED MEAT AND PROCESSED MEAT

Numerous studies show that a diet high in animal fat increases the risk of several types of cancer, including colon cancer. And while a high intake of red meat is of concern, packaged and processed meats present an even greater risk. Research has also shown that fatty foods boost the production of bile acids and hormones that contribute to the development of cancer. By contrast, vegetarians are almost 40 percent less likely to get cancer when compared to regular red meat eaters.

BY AVOIDING ALCOHOL

Numerous studies have shown that men who consume as little as two drinks per day and women who consume as little as one have a far greater chance of developing hepatocellular carcinoma as well as a slew of other cancers. In fact, for every 10 grams of alcohol consumed on a daily basis, the risk

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of colorectal cancer goes up by seven percent. The risk of breast cancer is even greater, with the same 10 grams of alcohol corresponding to as much as a 12 percent increase.

BY FOLLOWING SUN THERAPY

Over one million Americans are diagnosed with skin cancer each year. Today, it is the most common type of cancer among men and women, accounting for about half of all cancer diagnoses. The first step in preventing skin cancer is to avoid ultraviolet (UV) ray exposure. We can do this by wearing sunscreen, avoiding midday sun, wearing protective clothing when outdoors, and staying well away from tanning beds. It's also important to remember that skin cancers can develop in parts of the body that never see sunlight. If you have a lot of moles, keep an eye on them and learn the ABCDE rules to better spot signs of developing malignancies.

DISCUSSION:

Ayurvedic anticancer therapy includes recommendations for lifestyle and use of specific foods and herbs which are very helpful not only in preventing the progression of the disease but also makes the patients feel better and comfortable overcoming the symptoms. *Ayurvedic* therapeutic regimen rejuvenates the body tissues, tones up the systems and act as a tonic to the body against cancer cachexia. This kind of orientation toward total healing and health promotion makes importance of spices, herbs and lifestyle modification are already explained in ayurveda. Now a days different types of research studies were conducted and some are still ongoing. And they proves importance of spices which already explained in samhita. *Ayurvedic* treatment approach to prevention of cancer. Because large population use *Ayurvedic* medicine worldwide, there is an urgent need for additional, carefully conducted, high-quality intensive research to evaluate its efficacy and to develop this discipline to meet ever-new challenges of modern medicine in the field of oncology.

CONCLUSION:

Majority of Spices and herbs, lifestyle habits described in this article have medicinal properties and are being used in traditional *Ayurvedic* system of medicine to treat various ailments in humans. They protect against the radiation-induced damage by scavenging of free radicals and increasing antioxidant status. This article may be useful in cancer patient for prevention, treatment and side effect reduction of radiation therapy. So this article helps to spread importance of spices, herbs and lifestyle habits for prevention and cancer and chemotherapy induced nausea, vomiting.

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