

Indigenous Asian Plants against Cancer: A Comprehensive Review

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Abstract An herb is a plant or plant part used for its therapeutic properties, flavor or scent, sometimes used as herbal medicines in the form of capsules, tablets, powders, extracts or teas. Herbal medicines have their origin from the ancient cultures including those of Indians, Chinese, American and Egyptians. People used it as dietary supplement to maintain or improve their general health like treating diseases, disorders and enhance well being often without any side effects. They are used to treat a range of diseases including arthritis, high blood pressure, anxiety, depression, hormonal imbalances, migraines, insomnia, cancer skin problems such as eczema and others. Some herbs have significant ingredients so the synthesized version of their naturally occurring compounds also act potently on any person getting treated of any ailment. This review highlights on the potential of herbs to prevent cancer.

Keywords Herbs, Cancer, Diseases, Plants

1. Introduction

The plant based medicines or herbal medicines are being used for treating different health conditions for human as well as animals from the ancient period as it is describes in Ayurveda. Historically, so many different species of plant have been reported as for being useful to humans. Naturally available medicines are preferably considered as a better way to help people feel better, relaxing or more to have control and cope with depression, anxiety and other conditions such as fever, cold, skin diseases etc.

Cancer is an abnormal growth, rapid division and proliferation of cells also known as malignant tumors. It can affect any tissue or organ in body [1]. The cause for cancer can be Nutritional deficiencies, hormonal imbalance, or some toxins present in your environment which can be treated by addressing these variables through purifying your environment, addressing your emotional state and dietary changes. If someone is seeing towards treating cancer it is very important to know about the cause because it is very rare for cancer having only one cause, so rather than simply being caused by a faulty gene we got from our ancestors, it may have been caused by other less understood heredity or environmental factors or a malfunction in our DNA. Chemotherapy is rarely the best option for it Cancer remains to be the major cause of death around the globe which has claimed more than 6 millions. Annual death tolls to 3500/million all over the world. There are a variety of drugs

that help to cure different types of cancers, but they produce severe consequences that are unwanted in medical treatment [2]. In current scenario over 1500 drugs to cure cancer are in various stage of development and more than 500 drugs are being tested clinically, but still there is an immediate need to develop efficient and cost effective drugs [3].

Herbal medicine uses plants, plant parts, or mixtures of two or more plants to treat illness as herbs may help people to reduce side effects, live longer and help to prevent cancer coming back, especially when they are combined with conventional treatment. It not only cures a particular disease but also nourishes the internal and external well being of a person. Such a method of natural treatment by the help of phytomedicines is called phytotherapy. These medicines have a vital participation in treating chronic debilitating and life threatening conditions of diseases. India is having a well-practiced and well recorded knowledge of herbal medicines. In its Himalayan region, a wide variety of plants are being used for general well-being of local inhabitants and thus have been studied to have medicinal properties due to which it is the hotspot of medicinal plants and thus can be rightly called the botanical garden of the world [4]. Plants growing in these areas interact with very stressful environment as drought, UV radiation, strong wind and desiccation which leads to alteration of biochemical profile of the plant tissues and forming a variety of secondary metabolites, having specific pharmacological activities. Secondary metabolic products like alkaloids, terpenes and polyphenols possess anticancer and antimutagenic activities [5]. The old systems of medicines like Ayurveda and Unani served an important platform for scientific research to explore molecules which are medicinally important from

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nature or in other words modern medicine is adopting the concept of Ayurveda and this advanced programme has been accepted globally.

As we know plants are in use as a medicine from a long time so there are such plants useful in cancer treatment:

- ***Aegle marmelos***: It is a plant native to India from the family Rutaceae commonly known as bael, golden apple, stone apple and bili. Lupeol is the main component of *Aegle marmelos* that exhibit potent anticancer property against lymphomas, breast cancer, ascites melanomas, and leukaemia. It also possess strong free radical inhibiting property and minimizes negative consequences of chemotherapy [6].
- ***Allium sativum***: It is a plant native to central Asia from the family Amaryllidaceae commonly known as garlic. It is used against breast cancer, prostate cancer and erythroleukemia [7].
- ***Aloe barbadensis***: It is a plant native to Asia from the family Xanthorrhoeaceae commonly known as Aloe vera or Indian aloe. It possesses strong anticancer and immuno-enhancing activities because of its components known as acemannan, emodin and lectins. It also shows activities like wound healing, stimulates the immune system, and prevents metastasis of liver cancer, stomach cancer and different skin cancers by inducing programmed cell death. It has a unique property to minimize ill effects of cancer treatment [8].
- ***Alpinia galangal***: It is a plant native to South Asia and Indonesia from the family Zingiberaceae commonly known as galangal. It prevents metastasis in colon by causing apoptosis. A flavonoid isolated from it known as Galangin possesses antimutagenic, antioxidant, strong anticancer and anti-inflammatory properties so specifically prevents prostate and breast cancers [9].
- ***Andrographis paniculata***: It is a annual herbaceous plant widely cultivated in Southern and Southeastern Asia from the family Acanthaceae and commonly known as kirayat, chiraita and kalmegh. Andrographolide, an active diterpine component has strong anticancer and immuno-enhancing property which effectively prevents cancers of kidney, colon, breast, prostate, ovary, stomach, malignant melanoma and leukaemia by effectively controlling the check points of cell-cycle and inducing apoptosis and minimizes negative consequences of cancer treatment [10].
- ***Amorphophallus konjac***: It is an evergreen plant, commonly known as konjak or elephant yam local to eastern parts of Asia from the family Araceae. Glucomannan, a compound found in *Amorphophallus konjac* protects mice against clinically induced lung cancer [11].
- ***Artemisia annua***: The herb, commonly known as sweet wormwood is native to temperate Asia from the family Asteraceae [12]. It is having anti malarial, antimicrobial, anti-allergic and anti-yeast qualities. According to latest researches, it also exhibits specific anti-cancer activity [13].
- ***Asparagus officinalis***: It is a flowering perennial plant, commonly known as sparrows Guts native to most of Europe, northern Africa and western Asia from the family Asperagaceae. Studies [14] show that it possesses anticancer property and having a role in controlling infections of urinary tract [15].
- ***Azadirachta indica***: It is a fast-growing tree, commonly known as Neem or Indian Lilac native to India and the Indian subcontinent from the family Meliaceae. *Azadirachta indica* contains liminoids, which exhibit antioxidant, anticancer, antifungal, antiulcer, antiviral, anti-inflammatory, antimutagenic, and antimetastatic properties. Liminoids and Nimbolide prevents metastasis of cancers by causing programmed cell death. It also minimizes negative consequences of cancer treatment [16].
- ***Bacopa monnieri***: It is a perennial herb native to the India, Australia, Europe, Africa, Asia and America from the family Plantaginaceae and commonly known as brahmi. The plant is bitter-sweet and cooling with a wide array of medicinal properties. It has been successfully studied and tested as astringent, laxative, anodyne, intellect promoting, carminative, anticancerous, anti-inflammatory, digestive, anticonvulsant, cardiogenic, depurative, bronchodilator, emmenagogue, sudorific, diuretic, febrifuge and tonic [17]. The chemical constituents like nicotine, cucurbitacin, herpestine, alkaloids and bacosides are responsible for the diverse properties of the plant.
- ***Bauhinia variegata***: It is a flowering plant native to South and Southeast Asia from the family Caesalpiniaceae commonly known as Orchid Tree. It prevents metastasis in liver, breast, oral cavity, lung, larynx and malignant ascites [18].
- ***Brassica oleracea***: Also known as wild mustard or broccoli, it is a tall biennial plant native to coastal Asia and Europe from the family Brassicaceae. It may reduce the risk of some cancers such as colorectal, breast, liver, lung, prostate, skin, stomach, and bladder cancers [19]. There is some evidence that broccoli contains chemicals which might help prevent cancer [20, 21].
- ***Bulpleurum scorzoneraefolium***: It belongs to family Apiaceae which is native to East Asia. It is a perennial herb which is also known as thorowax. The natural constituents of the herb are sterols, lignans, flavanoids, coumarins and polyacetylene are responsible for the medicinal properties of the plant. Studies have highlighted its property to produce interferon which is particularly helpful in treatment of bone cancer [22].
- ***Camellia sinensis***: It is a flowering plant, also known as tea tree native to East, South and Southeast Asia, from the family Theaceae. It is used to prevent colon, prostate and gastric cancers [23]. It seems to control some cancers by checking the blood vessel growth in tumors [24]. It is also used to prevent skin cancer [25].

- ***Carmona retusa*:** Commonly known as Fukien Tea Tree or Philippine Tea Tree, *C. retusa* is a flowering plant native to eastern and south-eastern Asia from the family Boraginaceae. Commonly used as tea or tonic to treat stomach ailments and popular as antibacterial and have a high potential infighting the growth and multiplication of cancer cells [26].
- ***Catharanthus roseus*:** It is the small shrub native to Madagascar, India and Sri Lanka from the family Apocynaceae. More commonly known as madagascar periwinkle, rosy periwinkle or baramaasi, all parts of the plant are used to treat various ailments, like leukemia, diabetes, menorrhagia [27]. The plant, which was initially used for the treatment of diabetes, is the source of first clinically used anti-cancer drugs vincristine (VCR) and vinblastin (VLB). Recently semi-synthetic analogs of these compounds, namely vinorelbine (VRLB) and vindesine (VDS) have been used along with other cancer chemotherapeutic drugs for a variety of cancers, including leukemia, lymphoma, Kaposi's sarcoma and cancer of testes, lungs and breast [28].
- ***Chrysanthemum morifolium*:** It is a perennial and flowering shrub from the family Asteraceae commonly known as Florist's daisy and Hardy garden mum. It reverses precancerous gastrointestinal lesions [29].
- ***Curcuma longa*:** More commonly known as Indian saffron or haldi, this plant from the family Zingiberaceae is a perennial herb native to South Asia. This spice has been extensively used in Asian traditional medicine as blood purifier, treatment of wounds and skin diseases. It has also shown to have anticancer, antioxidant, anti-inflammatory and antifungal activity [30]. Thus it becomes a vital plant to treat the cancer of colon and polyps and recent study shows that it can suppress malignant growth by preventing blood supply [31]. It is also used to manage gastrointestinal discomfort and colorectal cancer.
- ***Dysoxylum binectariferum*:** It is a flowering plant from the family Meliaceae, native to India. Flavopridol is an effective agent against lung and breast cancer since it expresses adequate tyrosine kinase activity [32]. An important pharmacological molecule known as Rohitukine, exhibits both anti-inflammatory as well as immuno-modulatory properties besides acting as an anticancer compound.
- ***Embllica officinalis*:** It is a deciduous tree native to India from the family Phyllanthaceae commonly known as emblic or amla. It is an effective inhibitor of free radicals. *Embllica officinalis* is reputed for compounds such as tannins and flavanoids, which are known as free radical scavengers and holds anticancer properties. It minimizes negative consequences of cancer treatment [33].
- ***Glycine max*:** It is a plant from the family Fabaceae, commonly known as soybean and native to East Asia. It inhibits cancer through induction of apoptosis by blocking angiogenesis and inhibiting tyrosine kinase inhibitor and inducing apoptosis [34]. It is also effective in skin cancer, nasopharyngeal carcinoma, malignant lymphomas, neuroblastoma, leukemia and malignant brain tumors [35].
- ***Glycyrrhiza glabra*:** It is a herbaceous perennial plant native to southern Europe and parts of Asia from the family Fabaceae commonly known as liquorice or licorice. It is effective in preventing variety of cancers such as cancers of stomach, breast, lung, liver, colon, leukaemia and kidney [36]. Cancer of lung and fibrosarcomas are effectively controlled by Glycyrrhizin which is an active ingredient of *Glycyrrhiza glabra*. It also boosts immunity.
- ***Kaempferia rotunda*:** Commonly known as blackhorm and bhoomi champa, it is a plant native to China, India, Nepal, Bangladesh from the family Zingiberaceae. The tubers are antitumour, anti-inflammatory, emetic and vulnerary. It widely used as a local application for tumours, swellings and wounds [37].
- ***Linum usitatissimum*:** It is an annual plant native to India from the family Linaceae also known as flax or linseed. The flax seed contains concentrated forms of 2 lignans enterodiol and enterolactone and it has been shown to work against breast cancer, lung cancer, prostate cancer and colon cancer [38,39].
- ***Morinda citrifolia*:** It is a tree native to Southeast Asia and Australasia from the family Rubiaceae and commonly known as Indian mulberry, noni or cheese fruit. Compounds identified in *Morinda citrifolia* are specifically active against cancer of lung and skin. It possesses strong antioxidant and immunoenhancing properties [40]. These properties are due to chemical such as americanin, nicotifloroside, narcissoside, asperuloside and citrifolinin.
- ***Momordica charantia*:** It is a herbaceous, tendrill-bearing vine widely grown in Asia, Africa, and the Caribbean from the family Cucurbitaceae commonly known as bitter melon, bitter gourd or bitter squash. It has antimicrobial, antiviral, anti HIV, antitumour and antimutagenic effects [41].
- ***Nigella sativa*:** It is also known as fennel flower or black cumin, an annual plant native to South and Southwest Asia from the family Ranunculaceae. Thymoquinone and dithymoquinone present in it have considerable activity against cancers of the colon, pancreas, prostate, uterus, lymphoma, malignant ascites, melanoma, sarcomas and leukaemia as an immunoprotectant [42]. It improves immunity and minimizes negative consequences of cancer treatment [43].
- ***Ocimum sanctum*:** An aromatic plant native to Indian Subcontinent from the family Lamiaceae, holy basil or tulasi contains compounds Eugenol, orientin and vicenin, which suppresses a variety of cancers and specifically fibrosarcoma by preventing nutrients and oxygen supply to malignant cells and thus causing their

death. It contains Polysaccharides which minimizes negative consequences of cancer treatment [44].

- ***Olea europaea*:** From the family Oleaceae, olive is a small tree, native to much of Africa, and southern Asia. It has been used to prevent breast cancer [45], colorectal cancer and in cardiovascular complications [46].
- ***Oryza sativa*:** It is a small plant native to Asia from the family Poaceae commonly known as Asian rice. It is useful to cure cardiovascular disease and colon or bowel cancer [47].
- ***Panax ginseng*:** It is a perennial plant native to North America and eastern Asia from the family Araliaceae commonly known as ginseng. The active compound, Ginsenosides isolated from it suppresses metastasis of breast, prostate, ovary, colon, lung, malignant lymphoma, malignant melanoma, cancer of the renal tissues and leukaemia by suppressing malignant growth and programmed cell death. It can be substituted to morphine to help cancer patients to get rid of their pain [48].
- ***Plantago ovata*:** Desert Indian wheat is a medicinal plant native to Asia from the family Plantaginaceae and is used to treat hypercholesterolemia, hyperglycemia, and cancer. Gerber (1996) had reported that it decreases absorption of carcinogens and unconjugated estrogens [49].
- ***Polygonum tinctorium*:** It is a plant native to Eastern Europe and Asia from the family Polygonaceae commonly known as Chinese indigo or blue dye plant. Their use increases the phagocytosis of white blood cells and decreases the permeability of the capillaries [50]. The leaves and fruits are used to protect and the prevention of leukemia [51]. Koya *et al.* had reported anticancer activity [52].
- ***Raphanus sativus*:** It is an edible root vegetable, more commonly known as radish, native to Southeast Asia, from the family Brassicaceae. The plant shows anti-tumour activity [53]. Almost all parts of the plant can be used to treat pulmonary and chest ailments [54]. Synthetic agent roscovitine which is an anticancer drug isolated from *Raphanus sativus*, is in Phase II clinical trials in Europe [55].
- ***Rhus succedanea*:** It is a flowering plant native to Asia from the family Anacardiaceae commonly known as wax tree. An ethanol extract obtained from leaves is acknowledged for its antiviral and anticancer properties [56]. Ethanol extract of sap also has anticancer activity [57].
- ***Saussurea lappa*:** It is a flowering plant native to cool temperate and arctic regions of Asia, Europe, and North America, from the family Asteraceae commonly known as saw-wort or snow lotus. It contains Shikokiol which express anticancer properties in suppression of various cancers and specifically malignant lymphoma and leukemia. It checks metastasis of intestinal cancer and breast cancer by causing apoptosis [58].
- ***Scutellaria barbata*:** It is a flowering plant native to Asia from mint family which is Lamiaceae, also known as barbed skullcap. It has been shown that it works against many cancers such as stomach (digestive system cancer), lung, prostate and intestine [59].
- ***Terminalia paniculata*:** It is a tree plant native to Southwest India from the family Combretaceae, commonly known as kindal. The stem bark is diuretic, anticancerous, cardiotoxic and shows antagonism of amphetamine hyperactivity [60].
- ***Triticum aestivum*:** Also called Wheatgrass, it is a plant found in temperate regions of Europe and Asia from the family Poaceae. It has been shown in many cases that breast cancer has been treated with wheatgrass therapy [61]. Most people use wheatgrass juice as a supplement along with other drugs since it can inhibit malignant growth and reduce fatality of disease [62]. Used to prevent colon cancer and other colon conditions [63].
- ***Vaccinium myrtillus*:** It is a shrub native to Europe and Northern Asia from the family Ericaceae commonly known as bilberry. This contains dense levels of anthocyanin pigments linked experimentally to lowered risk for several diseases of eye, cardiovascular system and cancer [64].
- ***Viscum album*:** Traditionally called mistletoe, *V. album* from the family Santalaceae is a shrub local to southern and western parts of Asia. It has been employed in checking internal haemorrhages in treating cancer of the stomach, lungs and ovaries [65]. Pharmacologically active compounds such as Lectins and Viscumin are effective in enhancing immune system and suppressing cancer.
- ***Vitex negundo*:** It is a large aromatic shrub native to tropical Eastern and Southern Africa and Asia from the family Lamiaceae commonly known as five-leaved chaste tree. Extracts of the leaves have shown bactericidal, antitumor and cytotoxic activity against cancer cell lines [66].
- ***Withania somnifera*:** *Ashwagandha* or Indian ginseng, winter cherry from the family Solanaceae is a very powerful herb of Ayurveda used since ancient times for a variety of conditions, but most well-known for its restorative qualities. It is a short annual shrub plant native to drier regions of India. Withanolides isolated from it inhibit cancers of the colon, lung, breast and central nervous system. Withaferin A is specifically active against androgen-refractory and androgen-responsive prostate cancers. It also minimizes negative consequences of cancer treatment [67].
- ***Zizyphus mauritiana*:** It is an evergreen shrub or small tree originated in South-East Asia from the family Rhamnaceae and is also commonly known as Ber or Masau. Betulinic acid is the major compound from the plant which inhibits growth of cancer cells. The treatment by the herb may show complete inhibition of tumor with no sign of side effects. In comparison of toxic chemotherapy drugs such as vincristine and taxol, it can be a promising alternative [68].

2. Discussion and Conclusions

Reference of herbal products over synthetic is rapidly increasing because of the fact that they are safe for humans and most important that they are ecofriendly. Herbs had been priced for their flavoring, medicinal and aromatic qualities for thousands of years. India has the long lasting system of medicines known as 'Ayurveda' where plant products are used as remedies for various diseases. A lot of work has been done on the medicinal plants for different kind of diseases such as those of heart, eye, cardiovascular system and cancer. These herbal plants can also stabilize the body equilibrium, conditioning the body tissue. Studies have shown that the cancer suppressing properties of these plants is due to presence of antioxidants by which they helps those whose immune systems are weakened as a result of chemotherapy treatments. These plants contain a variety of pharmacologically active agents, that are easy to isolate and can be utilized as raw material for various scientific investigations. The combination of these components of the plants discussed above can be assessed for their reinforcing effect. Standardization of medicinal dose may be a good step towards the remedy for cancer as cancer is spreading rapidly worldwide and it seems very urgent to move a step forward towards the cure of cancer for the wellbeing of people.

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