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Therapeutic applications of herbal medicines for cancer patients

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Abstract
Medicinal herbs and their derivative phytocompounds are being increasingly recognized as useful complementary treatments for cancer. A large volume of clinical studies has reported the beneficial effects of herbal medicines on the survival, immune modulation, and quality of life (QOL) of cancer patients, when these herbal medicines are used in combination with conventional therapeutics. Here, we briefly review some examples of clinical studies that investigated the use of herbal medicines for various cancers and the development of randomized controlled trials (RCTs) in this emerging research area. In addition, we also report recent studies on the biochemical and cellular mechanisms of herbal medicines in specific tumour microenvironments and the potential application of specific phytochemicals in cell-based cancer vaccine systems. This review should provide useful technological support for evidence-based application of herbal medicines in cancer therapy.

Keywords: toxicity, medicinal herbs, plant compounds, cell line

Introduction

Common Use of Herbal Medicines as Adjuvant Treatment in Chemo- or Radio-Cancer Therapy

For the above adjuvant anticancer therapy research, herbal medicine in general become implemented as a combination remedy with the conventional chemotherapy to optimistically growth the therapeutic advantage and pleasant of lifestyles (QoL) as well as to lower the side results or headaches. Between 28% and ninety-eight% of ethnic Chinese cancer patients in Asia [2, 3] and 25% to forty-seven% of these residing in North America is pronounced to have used natural medicines as a part of their cancer care [4, 5]. Although several natural medicines were determined to be adjunctive in chemo- and radiotherapy, maximum medical trials or studies had been stated mainly, if not only, in China or other Asian international locations and they are without a doubt now not referred to on PubMed. In 2010, Qi and associates [6] furnished a systematic overview of Chinese natural drug treatments in scientific trials, particularly as adjuvant treatments to reduce complications and facet consequences of chemo- or radiotherapy. Several historically used Chinese herbal drugs, which includes astragalus [7, 8], Turmeric (curcumin) [9, 10], Ginseng [11, 12], TJ-forty-one (Bu-Zhong-Yi-Qi-Tang) [13, 14], PHY906 [15, 16], Huachansu [17, 18], and Kanglaite [19, 20], are commonly utilized by cancer sufferers to either "deal with" most cancers and/or "lessen the toxicity" precipitated via chemotherapy or radiotherapy. Preclinical and clinical research have indicated that these natural drug treatments may possess some of advantages in terms of suppression of tumour progression, by using growing the sensitivity of chemo- and radiotherapeutics, improving immune gadget characteristic, and easing the tissue/physiology harm resulting from chemo- and radiotherapeutics [21].

1. Essiac Tea

Fig 1: Essiac Tea

An herbal tea combination referred to as Essiac tea consists of herbs recognised for their immune-boosting results, which includes burdock root. Research indicates Essiac tea does not remedy cancer, however it does contain more antioxidants than red wine or green tea. The Memorial Sloan Kettering Cancer Centre conducted about 18 studies on Essiac within the 1970s and Eighties. These studies observed Essiac did not enhance the immune gadget or kill cancer cells.

2. Hypericin

Fig 2: Hypericin

This compound is found in St. John's Wort and it can help kill most cancers cells. According to a 2000 study published inside the Medical Journal of Australia, hypericin makes sure most cancers cells more likely to die after photodynamic remedy, that's an experimental remedy for mesothelioma.

3. Ginger

Fig 3: Ginger (23)

This herb suggests anti-inflammatory and anti-most cancers consequences in lab studies. It can also lessen chemotherapy-related nausea and vomiting, in step with a 2000 overview posted within the British Journal of Anaesthesia. But ginger should be strictly averted before and after surgical operation. It promotes bleeding and ought to be prevented by way of sufferers with a low platelet count. Ginger has been considered ten thousand times more powerful than chemotherapy for the treatment of cancer. It is an anti-oxidant and a natural cancer fighter. The active compounds 6-gingerol and 6-shogaol exhibit anti-cancer properties against the gastrointestinal tract and helps in cancer cell death. Evidences from *in vitro*, animal, and epidemiological studies suggest that ginger and its active constituents suppress the growth and induce apoptosis of variety of cancer types including skin, ovarian, colon, breast, cervical, oral, renal, prostate, gastric, pancreatic, liver, and brain cancer.

4. Aloe Vera

Fig 4: Aloe Vera

A 2011 assessment posted in Cochrane Database Systematic Reviews mentioned that taking aloe vera during chemotherapy helped prevent mouth sores in some patients. (1). Aloe may cause severe side effects when used as a cancer treatment. People mainly use aloe vera for skin conditions. While aloe vera juice is not a treatment for lung cancer, aloe vera itself might provide some lung benefits. The plant's anti-inflammatory abilities could possibly improve respiratory problems caused by asthma, emphysema, and chronic bronchitis.

5. Podophyllotoxins

Fig 5: Podophyllotoxins

Epipodophyllotoxin is an isomer of podophyllotoxin family extracted from the basis of the Indian podophyllum plant (Podophyllum peltatum). Etoposide and teniposide are energetic and semi-artificial compounds of podophyllotoxin. Such compounds act through inhibiting topoisomerase II. Etoposide is permitted by using FDA for remedy of chorio carcinoma, lung cancer, ovarian and testicular cancers, lymphoma and acute myeloid leukemia. The permitted indications for teniposide are vital fearful gadget tumours, lymphoma, and bladder most cancers.

6. Ginseng

Fig 6: Ginseng

Ginseng is an herb that includes Asian ginseng (*Panax ginseng*) and American ginseng (*Panax quinquefolius*), both of which have been used for their medicinal properties.[1]Though various types of ginseng extracts or derivatives have shown anticancer properties in human cancer cell lines, there are no published clinical trials evaluating ginseng's efficacy in a human population.

Ginseng has, however, been studied as a chemopreventive and an agent to improve quality of life among patients with cancer.

Look at of 905 cancer cases and 905 controls conducted in Korea advised that ginseng consumption considerably reduced most cancers occurrence (odds ratio [OR], 0. Fifty-six; ninety-five% CI, zero. Forty-five-0.69), with extra efficacy visible with ginseng extract and powder as compared with fresh slices, juice, or tea. 2

Patient recollect for ginseng-use turned into good, with an eighty-five% settlement of ginseng-use among 2 exclusive interviews. Another case-manage take a look at of 1987 pairs showed a extensive affiliation between ginseng-use and decreased most cancers threat (OR, zero.50; ninety five% CI, zero.Forty four-0.58).Three Though fresh extract or any practise of white/crimson ginseng were effective, the best association was determined with purple ginseng extract (OR, 0.20; ninety five% CI, 0.08-zero.50).These information were supported by way of consequences from a prospective study of 4634 Korean topics elderly forty or older. Four In this have a look at, ginseng-use resulted in a widespread reduction in most cancers occurrence in comparison with non-use (relative hazard [RR], 0.40; ninety five% CI, 0.28-zero.Fifty six), demonstrating a dose-reaction relationship in which higher consumption or extra frequency of ginseng-use was associated with a greater discount in cancer occurrence.(23).

7. Dong Quai

Fig 7: Dong Quai

This information is provided by Breastcancer. org. to support free resources and programming for people affected by breast cancer.

Also known as:

- Angelica sinensis,
- Chinese Angelica
- dang gui, danggui
- dong qua
- ligustilides
- tan kue bai zhi
- tang kuei.

An aqueous extract from dong quai showed estrogen-agonist activity, and stimulated proliferation of both estrogen receptor-positive and -negative breast cancer cells Interestingly, in a test-tube study, dong quai was again found to be nonestrogenic, and yet it nonetheless stimulated the growth of breast cancer cells. Although the mechanism of this effect is not known, the results suggest that women who have had breast cancer should avoid using dong quai.

8. Astragalus membranous

Fig 8: Astragalus membranaceus (24)

AM is a very common Chinese medicine in China, belonging to the leguminous plant (Figure 3). Its main medicinal ingredients are astragalus polysaccharide and astragaloside, which have good immune and antiviral functions. Astragalus polysaccharide is the most active ingredient in astragalus, and the higher concentration of ethanol extract has stronger activity.

9. Achillea wilhelmsii

Fig 9: Achillea wilhelmsii

Achillea plant with clinical call Achillea wilhelmsii is from Asteraceae order and Compositaea genus. Achillea has unique species however Achillea wilhelmsii is more common in Iran and grows in exceptional areas. Achillea wilhelmsii is a gramineous, perennial, and short plant of 15 to 40 cm. Methanol extracts and essence of leaves of this plant have cytotoxic results on colon most cancers cells (HT-29) and cytotoxic outcomes of essence are higher. In other studies, consequences of methanol extracts of plant's leaves in opposition to mobile lineage of colon most cancers and most cancers of stomach and breast are shown. Methanol extract of plant carries phenol compounds, especially flavonoids, which suppress duplicate of most cancers' cells via inducing apoptosis. One of the most crucial monoterpene compounds of this plant that causes

apoptosis in human melanoma cells is 1, eight-cineole and α-piene in flowers' leaf essence. Achillea wilhelmsii (AW) widely grows in various parts of Iran, especially in the central and western areas. This herb is a rich source of flavonoids and sesquiterpene lactones. It is also an important plant in traditional Persian medicine.

10. Tinospora cordifolia (Wild) Miers

Fig 10: Tinospora cordifolia (Wild) Miers

Tinospora cordifolia, also known as guduchi in Sanskrit, giloya in Hindi and heartleaf moonseed plant in English, is a bulky, smooth, climbing deciduous shrub lacking bristles. The most used part of the shrub is the stem, but roots are also known to contain important alkaloids. This shrub is commonly found in India, Myanmar, Sri Lanka and China. According to ancient Ayurvedic lexicons, T. cordifolia is also referred to as "amrita". The term "amrita" is ascribed to this plant due to its ability to impart youthfulness, vitality, and longevity.

11. *Curcuma longa* Linn

Fig 11: *Curcuma longa* Linn

Curcuma longa is popularly known as turmeric in English, haridra in Sanskrit and haldi in Hindi. The rhizome of the plant is traditionally used in cooking the active ingredient of this plant is curcumin (diferuloylmethane, chemical structure shown below), a polyphenol derived from the rhizome of the plant [38]. Turmeric is used for both cancer prevention and treatment [39] The anticancer potential of curcumin is associated with its ability to inhibit proliferation in a wide variety of tumor cell types [40-41]. The anti-proliferative properties of curcumin may be related to its ability to down-regulate the expression of a few genes, including NF-kappa B, Activator Protein 1 (AP-1), Epidermal growth receptor 1 (EGR-1), cyclooxygenase 2 (COX2), lysis oxidase (LOX), nitric oxide synthase (NOS), matrix metallopeptidase 9 (MMP-9), and tumor necrosis factor (TNF) [42-43]

12. Withania somnifera (Linn.) Dunal

Fig 12: Withania somnifera (Linn.) Dunal

Withania somnifera (Linn.) Dunal (Solanaceae) known as ashwagandha in Sanskrit and Hindi, winter cherry in English, is a small subtropical shrub. The roots and leaves of W. somnifera have been used in the Indian traditional system of medicine Ayurveda, and the plant is marketed world-wide because of its medicinal properties. It is also one of the members of GRAS (generally regarded as safe) category of plants that has found several therapeutic uses [44]. -2007]. This W. somnifera formulation appears to offer a multi-modal action against cancer disease as evidenced by their current studies [48]. W. somnifera formulation has been shown to induce cell cytotoxicity in several human cancer cell lines [49] The suggested mechanisms of cytotoxicity include activation of both intrinsic and extrinsic apoptosis signalling cascades, triggered by augmented generation of reactive oxygen species (ROS) and nitric oxide (NO) in cancer cells [50].

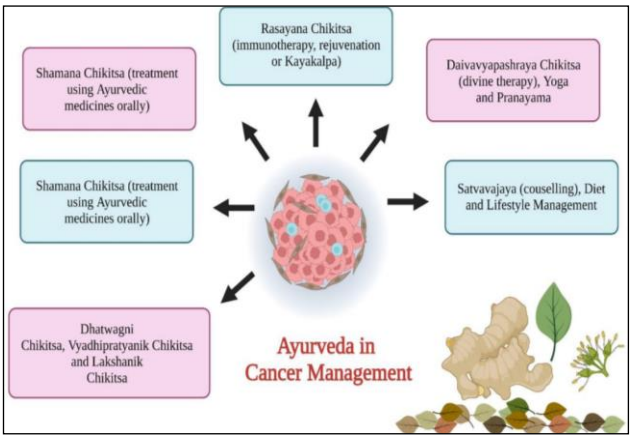

Fig 13: Ayurveda in Cancer Management

Conclusion

Any practical solution to controlling the initiation and progression of cancer is of paramount importance. The use of medicinal plant products to manage or arrest the

carcinogenic process provides an alternative to the use of conventional allopathic medicine for treatment of the disease. Many herbs have been evaluated in clinical studies and are currently being investigated to understand their tumoricidal properties against various cancers [51].

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