



The Role of Plants on Cancer Patients

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Abstract

Background: Traditional herbal medicine has been used for centuries to help cancer patients manage the difficulties associated with the disease and its treatments. This form of medicine utilizes various plants to provide beneficial effects such as immune system support, stress reduction, pain relief, and addressing emotional difficulties.

Objective: The objective of this study is to highlight the potential benefits of traditional herbal medicine in helping cancer patients cope with the challenges they face. The focus will be on how combining multiple plants tailored to each patient's needs can achieve the best results in terms of providing hope and improving overall well-being for both the patients and their loved ones.

Results: The results of this study show that traditional herbal medicine has the potential to offer cancer patients significant benefits. By utilizing a combination of plants personalized to each patient's needs, this form of medicine can provide support for the immune system, reduce stress, alleviate pain, and address emotional

difficulties. These benefits contribute to an overall improvement in the well-being of patients and their loved ones.

Conclusion: In conclusion, the findings of this study support the use of traditional herbal medicine in helping cancer patients manage the challenges they face. By recognizing the potential benefits of combining multiple plants tailored to individual patient needs, this form of medicine offers hope and improved overall well-being for those affected by cancer. Further research and consideration of traditional herbal medicine as a complementary therapeutic approach for cancer patients is warranted.

Introduction

Cancer is a deadly disease with a rising number of victims. Researchers are working on new treatments, but current therapy brings heavy burdens to patients. A holistic approach, including natural products, can help alleviate symptoms and improve quality of life for cancer patients. Plant species have been used for various purposes throughout history, and their derived products can be beneficial as supplemental treatments for cancer patients.[1]

The effects of plants can include phytochemicals, essential oils, and whole plants used in various preparations. The use of plants in cancer treatment dates back to ancient civilizations, but scientific study of these effects is relatively new. With cancer being a widespread and often deadly disease, there is growing interest in the potential role of plants in cancer treatment. This interest is driven by the need to reduce suffering and improve survival rates for cancer patients. As a result, research on the effects of plants and plant components on cancer patients has become a prominent area of study in recent years.[2]

The purpose of this study is to identify beneficial roles of plants for cancer patients, emphasizing the importance of the forest. It is challenging to elaborate on all the roles due to their numerousness. However, it is easier to describe what Mother Nature does. Literature can also provide some help. Nevertheless, this topic is neglected. Many features described here apply to other serious diseases. Cancer patients are often overwhelmed by plant-based meals. They receive a harsh treatment and suffer severe weight loss, so meat is essential for energy. However, plants play a crucial role in supporting life and should not be overlooked for their medicinal benefits.

Mechanisms of Action of Plant-Derived Compounds in Cancer Treatment

The development of cancer involves a series of steps that transform normal cells into highly proliferative, migratory, potentially immortal cells, capable of evading mechanisms that control cell growth and repair. Plant-derived compounds can affect the biological and physiological characteristics of cancer cells and alleviate cancer patients' suffering. These compounds have been essential in modern cancer chemotherapy, and their use as chemo-preventives is being explored. In addition to single compound agents, plant extracts and mixtures of phytochemicals can act additively or synergistically to provide enhanced efficacy and broader therapeutic effects. Plant phytochemicals can not only act on cancer cells but also counteract the various side effects suffered by cancer patients, improving their quality of life.[2]

A. Antioxidant and Anti-inflammatory Properties

Cancer hallmarks oxidant stress and chronic inflammation are implicated with over 20 human cancer types. Many cancer treatments use ionizing radiation and anticancer drugs, which increase ROS. Thus, improved antioxidant defenses or lower ROS accumulation make some cancers resistant to chemotherapy and radiotherapy. The presented results suggest phytochemicals in plants that produce pro-oxidant effects in cancer cells while protecting normal cells. These compounds are selective because in some cancer cells, antioxidant defense systems do not neutralize pro-oxidant effects, unlike in normal cells. [3]

Cancer patients today seek alternative treatment, especially phytotherapy, for benefits. Herbal medicine, botanical phytotherapy, and phytopharmacy use plants to treat cancer, preserve health, and relieve symptoms. Interesting plants may help cancer sufferers stay healthy. Some plants reduce chronic inflammation, scavenge free radicals, and protect cells from oxidative stress, UV, ionizing, and chemical carcinogens. These herbs may also prevent and treat precancerous lesions. [4]

B. Induction of Apoptosis and Cell Cycle Arrest

Apoptosis, or programmed cell death, is a response to various cellularly damaging stimuli, unlike necrosis, which occurs in response to acute cellular injury. Many cancer chemotherapeutics and ionizing radiation induce apoptosis in exposed cancer cells, and avoiding it can help establish resistance to these agents, either intrinsically or acquiredly. [5] Understanding the factors controlling apoptotic response is crucial for developing rational sensitization strategies. Recent years, plant compounds have emerged as potential regulators of apoptosis, alongside chemotherapeutic agents. This review explores our current understanding of plant compound regulation of apoptosis. [6]

Mammalian cells tightly regulate their proliferation through two processes: (i) arresting the under-proliferation of damaged DNA, and (ii) allowing the formation of an appropriate intracellular environment, which provides the necessary molecules and connections between the molecular

machinery and growth factors. For cancer cells to pass through the cycle and proliferate, they must, in some way, release these controls. Loss of control at these points is one of the most common abnormalities observed in numerous tumorigenesis and cancer cell cycle progressions. [7]

C. Inhibition of Angiogenesis and Metastasis

Since the dawn of life, plants have provided necessary nutrients and healing substances. When paired with chemotherapy, several phytochemicals reduce tumor size, making them effective cancer treatments. Due to cancer kinds and the multistep carcinogenesis process, phytochemicals target distinct pathways. Thus, new treatment combinations may be conceivable. Phytochemicals' antioxidant properties scavenge reactive oxygen species, fighting cancer. Phytochemical detoxification enzymes prevent DNA damage and cancer. Thus, a diet rich in fruits and vegetables can prevent cancer or boost phytochemical adjuvant therapy. [8]

Tumor spread requires angiogenesis, the development of new blood vessels. Plant-derived chemicals decrease tumor angiogenesis, a key trait for cancer drug development. Pro- and anti-angiogenic factors carefully regulate angiogenesis, causing excessive or insufficient blood vessel creation depending on the imbalance. Since most normal tissues are avascular and tumor progression requires oxygen and nutrients from blood vessels, tumor angiogenesis management reduces the supply of crucial components for tumor growth. Therefore, we favor phytochemicals that limit new blood vessel creation without hurting endothelial cells for cancer treatment. [9]

Popular Plant-Derived Compounds in Cancer Treatment

The medical use of plant-derived compounds dates back to ancient times and is still prevalent today. These compounds are rich in secondary metabolites with potential pharmaceutical benefits, including anticancer activities. The search for cancer-fighting agents from phytochemicals is supported by various criteria, and plant-derived compounds have shown promise in combination with standard chemotherapeutic drugs for more effective cancer treatment with reduced side effects. This makes them important in cancer therapy and research.

Rottlerin

Rottlerin is a polyphenolic molecule found in *Mallotus philippinensis*. It fights cancer by targeting signaling pathways that play a part in cell survival, proliferation, invasion, angiogenesis, and inflammation. Due to its reported actions and internet shopping, several cancer patients consume commercial rottlerin preparations. We do not recommend Rottlerin for cancer treatment due to its incomplete clinical development. In this review, we examine rottlerin's effects and molecular processes on cancer hallmarks and prior study concentrations. High-quality in vivo or clinical investigations would help determine rottlerin's anticancer potential. [10]

Cancer patients benefit from the use of several plant extracts or natural components with chemotherapy medications. Understanding scientifically proven benefits helps patients and doctors make better decisions. Additionally, chemotherapeutic agent interactions must be considered. This chapter discusses exploratory research on cancer cell lines using commercial plant chemical formulations, probable modes of action, and concentrations.

Curcumin

Curcuma longa and *Zingiber officinale* ethanolic extracts may improve curcumin's water solubility and bioavailability. Small amounts of curcumin in foods may help cancer patients who receive hormone therapy but experience unpleasant symptoms from the medications and hormone shortages. It is crucial to warn breast cancer patients on hormone therapy and a low-fat diet to avoid piperine-containing foods like grapefruit and marmalade. You can add turmeric to other foods to enhance their taste and alleviate joint pain, hot flushes, and other symptoms of the disease and hormone deficits. [11]

Ayurvedic and Chinese traditional medicine have used curcumin, derived from the turmeric rhizome (*Curcuma longa*), to treat wounds and prevent disease. Many countries are interested in its potential as a chemopreventive and anticancer agent. Studies have demonstrated that curcumin modulates multiple cell signaling pathways associated with inflammation, tumor cell survival, and proliferation, counteracts chemo- and radiotherapy-induced side effects, and influences therapeutic efficacy. Curcumin's limited bioavailability reduces its potency. Several methods have been used to create formulations that combine it with other molecules to improve its solubility, stability, or activity. [12]

Resveratrol

Resveratrol also upregulates tumor suppressor genes. In addition to its direct actions, resveratrol reduces cancer cell resistance to chemotherapy and inflammation-mediated carcinogenesis. Although resveratrol inhibits cancer growth in vitro and in vivo, its limited bioavailability is a problem. Overall, resveratrol's several modes of action make it a potential phytochemical for cancer prevention and treatment. [13]

When infected by fungi, *Vitis* and other plants produce stilbenes like resveratrol. It is present in grapes, peanuts, and plants. Resveratrol is anti-inflammatory, cardioprotective, and anti-cancer. Resveratrol has these effects because it inhibits cancer cell multiplication. It reduces cyclooxygenase enzymes, nuclear factor kappa B, and protein kinase C signaling. Additionally, it can promote tumor cell differentiation, cell cycle arrest, and death. Resveratrol selectively upregulates proapoptotic signals and downregulates antiapoptotic signals. [14]

Quercetin

Quercetin inhibits numerous cancer cells, as well as early carcinogenesis. Quercetin inhibits colon cancer growth in animals, as well as breast, colon, prostate, and lung cancer cell lines in humans. Quercetin also boosts cancer cell cytotoxicity with several chemotherapeutics. Quercetin has a low absorption rate and requires high doses as a supplement. [15]

Many vegetables, including onions, broccoli, and apples, as well as tea, contain flavonoids, which are important in cancer prevention. Quercetin is one such flavonoid that has gained considerable attention for its anticancer properties. This antioxidant can scavenge highly reactive free radicals in the body, making it an ideal natural cancer inhibitor. In addition, quercetin can support the body in the removal of carcinogens and inhibit both the synthesis and release of histamine, which can stimulate some types of cancer. [16]

Berberine

Berberis plants produce the isoquinoline alkaloid berberine in their roots, rhizomes, stems, bark, and flowers. It has been used for years in traditional medical systems to treat a variety of diseases. Traditional medicine has used berberine for over a millennium without demonstrating long-term side effects at low doses. Berberine may be effective in our growing community of people with frank hypertension and pre-hypertension, in which malignant alteration of the vascular endothelium may lead to a neoplastic condition. [17]

Long-standing recommendations for cancer prevention and therapy include diet and nutrition. Over the past decade, diet studies have expanded from vitamins, minerals, and essential fatty acids to a wide range of phytochemicals. Researchers are studying phytoestrogens, indoles, isothiocyanates, and other plant phenolics for cancer prevention and treatment. Many plant-based chemotherapy medications are made from natural substances. Various pharmaceutical companies are developing cancer medicines by screening plant components. [18]

Withaferin A

After treatment, we observe DNA damage, CHK1/2, p38 MAPK, and JNK activation, as well as intrinsic and extrinsic cell death mediation. In sensitive cells, Withaferin A may cause cell cycle

arrest by modulating cyclin B1 and CDK1 expression, CDC25C phosphatase degradation, or p34cdc2 kinase inactivation. It might also stop cells from growing by changing markers for metastasis and stem cells, such as Notch-1, NFkB, SOX9, Oct-3/4, Nanog, Aldehyde Dehydrogenase-1, LRP5/6, β -catenin, or microRNA-21. [19]

Given the huge variety of plant secondary metabolites with potential anticancer properties, their study has a major impact on cancer biology. The ability of phytochemicals to work on various signaling pathways, preferably with low toxicity, makes them valuable in cancer treatment. Withaferin A is a steroidal lactone from an Indian traditional medicine plant. It lowers all four types of p53 mutant human prostate cancer (PC) xenografts by turning down Akt/mTOR signaling. It has also been suggested that inhibiting Hsp90-dependent prosurvival signaling may cause withaferin A-induced apoptosis in AIPC cells. [20]

Reasons for Use of Herbal Medicine by Cancer Patients

The reasons for cancer patients turning to herbal medicine are multidimensional and complex. Dissatisfaction with conventional treatments, such as chemotherapy and radiation, is a significant driver. These traditional treatments often have severe side effects such as nausea, fatigue, hair loss, and immunosuppression, impacting a patient's quality of life and leading them to seek more tolerable alternatives. It is essential for both patients and healthcare providers to consider the potential benefits and potential risks associated with the use of herbal medicine.[21]

Another reason for the use of herbal medicine by cancer patients is the perceived benefits of natural remedies. Some patients believe that natural plant-based remedies are safer and more effective than synthetic drugs. The traditional use and perceived efficacy of herbal medicines can be compelling factors for patients seeking relief from cancer symptoms. The idea of using natural substances that are perceived as gentle or compatible with the body's natural processes is appealing to many patients. It is important to acknowledge these perceptions and offer evidence-based information to support informed decision-making.[22]

A holistic approach to cancer care is also a driving factor behind the use of herbal medicine. Patients may seek complementary therapies that align with their holistic health philosophies, such as herbal medicine, dietary changes, physical activity, stress management techniques, and lifestyle modifications. The hope is that these therapies will support overall well-being and potentially enhance the body's ability to combat cancer. It is important for healthcare providers to understand and respect the holistic approach that many patients take toward their cancer care while providing evidence-based guidance and support.[23]

It is crucial to recognize the reasons behind the use of herbal medicine by cancer patients and to address the multifaceted nature of their decision-making process. By gaining insights into these motivations, healthcare providers can better support patients in making informed decisions about incorporating herbal medicine into their cancer care regimens. Additionally, it is essential for healthcare providers to communicate openly with patients about the potential benefits and risks associated with herbal medicine and to work collaboratively to develop comprehensive and individualized care plans.

Conclusion

In conclusion, Plants provide pharmaceutical benefits and alleviate stress for cancer patients. They reduce exposure to toxic substances, and their vital connection sustains human life. Many modern pharmaceuticals are plant-based, but their efficacy and safety must be considered.

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