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# Review Of Medicinal Plants And Their Application In Cancer Therapy

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## ABSTRACT

Cancer affects individuals worldwide. Novel treatments are needed to treat and prevent this deadly disease. Science is studying natural chemicals since they have fewer adverse effects than chemotherapy. Plant secondary metabolites may be used to develop novel anticancer drugs. These compounds, which have become cancer treatments, are advancing the science. Most chemotherapy drugs restrict dose, develop resistance, and are non-selective to normal cells. Making effective cancer treatments is therefore still a clinical challenge. However, plants are rich in naturally occurring chemicals that are physiologically active and may have commercial value or be utilized to generate modified derivatives with increased activity and/or reduced toxicity in cancer treatment. The potential efficacy, accessibility, low cost, lack of toxic side effects, and high use rates of herbal medicines means that they are being seriously considered as anticancer therapy. Science has accelerated. Traditional medicines are safe and effective, hence the WHO recommends them. We reviewed several anticancer herbs.

**Keywords:** Medicinal plants, Anticancer, Cell line, Traditional medicine, Phyto compounds

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# INTRODUCTION

A lot of progress has been made in the treatment and prevention of cancer, and it has been a continual fight everywhere. The condition is characterized by an uncontrollable or irreversible cell proliferation in the human body. Resulting in the growth of cancerous tumours that have the potential to spread [1] Chemotherapy, radiation, and medications made from chemicals are now used as therapies. Chemotherapy may stress and harm patients. Thus, complementary and alternative cancer treatments are prioritized [2]. Herbal treatments have long been the backbone of medical care in developing countries. Plants in medicine have antimicrobial properties. Researchers are looking at extracts from land plants to find ways to treat cancer with nanomaterial [3]. Several types of plants can treat or stop cancer. Several studies have found that some plant species used in poor herbal therapies have anticancer properties [4,5,6,7,8].Plant kingdom chemicals required for plant survival and "housekeeping" may inhibit malignant cell proliferation and induce apoptosis. This article summarizes plant-derived anticancer drugs.

## Epigenetic characteristics

Alterations to epigenetic processes and their dysregulation have a role in the development of cancer [9]. Cancer cells have dysregulated control over the hypermethylation of tumor-suppressor genes on CpG islands. Tumor-suppressor genes may become inactive as a consequence of this [10]. Under recent years, medications that may prevent or undo epigenetic changes have been in development.

Chemically generated epigenetic drugs including SAHA (Vorinostat, Zolinza), FK228 (Romidespin, Istodax), and 5-aza-2-deoxycytidine (decitbine, Dacogen) have been investigated. DNMT and HDAC inhibitors, respectively. However, making a chemical treatment that selectively kills cancer cells but not normal ones is difficult. As a result, there is a growing need for anticancer drugs derived from organic sources, with a focus on plant species and their chemical compounds [11]. All cancers share susceptibility to signals that inhibit cell growth and produce an unending cycle of replication. Cancer cells persist because apoptosis is never produced and angiogenesis is maintained [12]. Plant-derived compounds inhibit cancer cell proliferation and induce apoptosis.

## Medicinal plants having anticancer potential

### *Heracleum persicum*

The *Agrobacterium tumefaciens* that caused potato disc crown gall tumours was stopped by a methanol and petroleum ether extract from the root and fruit of the *Heracleum persicum* (Apiaceae) plant. *H. persicum* essential oils have 2.24 mg/mL IC50 anticancer activity [13].

### *Ophiorrhiza mungos*

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The *Agrobacterium tumefaciens* caused crown gall tumours on potato discs were stopped by a methanol and petroleum ether extract from the root and fruits of *Heracleum persicum* (Apiaceae). H. The IC50 for how well persicum essential oils fight cancer was 2.24 mg/mL.

***Rhizophora apiculata***

Luteolin-7-O-glucoside (LUT7G) and camptothecin were taken from the methanolic extract of the leaves and roots of *Ophiorrhiza mungos* (Rubiaceae). They were tested for their anticarcinogenic ability in 4 cancer cell lines (COLO 320 DM, AGS, MCF-7, and A549) and the healthy VERO cell line. The antiradical activity, DNA fragmentation, -catenin expression, and chemo preventive efficacy in vivo were used to measure LUT7apoptosis-causing G's ability. 20 mg/kg lowers the activity of tumour cells [14,15].

***Peristrophe bicalyculata***

In lab tests, 2.5–22.3 g/ml of *P. bicalyculata* (Acanthaceae) oil killed human breast cancer cells MCF-7 and MDA-MB-468. A lot of beta-caryophyllene (33.9%), alpha-zingiberene (10.4%), germacrene D (5.0%), and globulol (5.0%) were found in *P. bicalyculata* oil. [16]

***Perilla frutescens***

*Perilla frutescens* (Lamiaceae) methanolic extracts were tested on human non-small cell lung A549 carcinoma cells to see if they stopped the cells from dividing. The methanolic extract of the stalk had some effects against cell growth. The stalks of *P. frutescens* may help fight cancer and act as antioxidants. At 10 g/ml, the stalk's hot water extract had moderate DPPH radical scavenging activity of 54.8%, while the leaf and seed extracts had only 5.5 and 6.7%, respectively. Cancer can be stopped by phytochemicals, polyphenols, and flavanoids [17].

***Rubia cordifoli***

The methanol extract was made by letting 80% methanol flow through powdered *Rubia cordifolia* roots (Rubiaceae). Many secondary plant chemicals, like two new dimers and four new naphthohydroquinones, were found in *R. roots of cordifolia*. These COX-2 inhibitors might be good places to start looking for ways to prevent cancer with chemoprevention. R. The new anticancer bicyclic hexapeptides RA-VI, VIII, XV, XVI, and XVII were made from the roots of *Cordifolia*. RA-IX and -X were found in *R. cordifolia*, are bicyclic hexapeptides with glutamic acid residues that fight cancer very well. RA-XI, RA-XII, RA-XIII, and RA-XIV were all taken from R. cordifolia, showed that it was very good at fighting cancer against P-388 [18].

***Radix sophorae***

Leachianone A from *Radix Sophorae* (Leguminosae) causes apoptosis in the human hepatoma cell line HepG2 in vitro through both extrinsic and intrinsic pathways with an IC50 of 3.4 g/ml after 48 hours of treatment. In human hepatoma HepG2 cells, an extract from the

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root of *Radix Sophorae* caused mitochondrial dysfunction, apoptosis, and the production and loss of reactive oxygen species (ROS) [19].

***Taxus yunnanensis***

High amounts of the anticancer taxane diterpenoids paclitaxel and dihalocephalomannine were found in an extract of the roots of the *T. yunnanensis* (Taxaceae) plant. When the leafy parts of *Taxus yunnanensis* were extracted with ethanol, they gave off 14 taxoids and two new taxane diterpenes called dantaxusin C and D. Twelve taxane diterpenes that had already been made from *T. yunnanensis* or *T. chinsis* aerial parts in EtOH extract were tested for their cytotoxicity against KB-VIN and KB-7d cancer cells that were resistant to drugs. The cytotoxicity of seven taxane diterpenes from an Ethanol extract of *T. chinensis* aerial parts was tested on nine human cell lines, including one that was resistant to paclitaxel. Taxane-type diterpenes like 10-deacetyl cephalomannine and 10-deacetyltaxol were found in T. yunnanensis wood extract in amounts that stop growth. Antiproliferative diterpenes [20].

***Vaccinium macrocarpon***

Triterpene cinnamates 3-O-p-hydroxycinnamoyl ursolic acid, which was found in *Vaccinium macrosporan* (Ericaceae) ethyl acetate extracts, had GI50 values of 20 M in most tumour cell lines that were a little bit more active. HepG2 liver cancer cells and MCF-7 breast cancer cells were used to test the antiproliferative effects of parts of cranberry extract. Ursolic acid, quercetin, and 3,5,7,3',4'-pentahydroxyflavonol-3-O-beta-D-glucopyranoside all had EC50 values of 87.4 2.7, 40.9 1.1, and 49.2 4.9 M, respectively [21,22].

**Plant chemicals having anticancer properties**

Industrialized nations consume many plants for their health benefits. Asia and Africa have used medicinal herbs for millennia. According to the WHO, some nations continue utilize plant-based medicines, while developing countries are taking advantage of the medicinal benefits of natural substances [23]. Terrestrial plant polyphenols, brassinosteroids, and taxols have anticancer properties.

**Polyphenols**

Cancer-fighting chemicals include flavonoids, tannins, curcumin, resveratrol, and gallacatechins [24]. Resveratrol is found in wine, grapes, and peanuts. Gallacatechins are found in green tea. Polyphenols are natural antioxidants that may be good for your health and lower your risk of cancer [25]. Many cancer cells are killed by polyphenols, which are antioxidants.

**Flavonoids**

Polyphenolic flavonoids are secondary plant chemicals with 10,000 different parts. They are chemicals in plants that affect how the body works, and their health benefits are being looked

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into [26,27]. Flavonoid concentration and cancer cell effects have been examined in several plants, including ferns and traditional Chinese therapies like litchi leaf [28]. Anthocyanins, flavones, flavonols, chalcones, and others are found in the seed 22. In 2013, Coa et al. found flavonoids and tested them on human lung cancer cells (A456 cell line) from the fern Dryopteriserythrosora. Flavonoids kill cancer cells and get rid of free radicals. Hepatoma (Hep-G2), cervical cancer (Hela), and breast cancer (MCF-7) are all resistant to the anticancer effects of pure flavonoids [29].

**Brassinosteroids**

Brassinosteroids (BRs) are plant hormones that regulate cell growth and differentiation, stem and root cell elongation, and disease and stress resistance. BRs regulate plant senescence [30]. Plant growth requires them. BRs are another natural cancer treatment. In research on cancerous cells, two natural BRs have been shown to have anticancer properties. At micromolar levels, 28-homocastasterone (28-homoCS) and 24-epibrassinolide (24-epiBL) stop cancer cells from growing [31,32].Cancer cells cannot apoptosis and proliferate endlessly. BRs interact with the cell cycle to restrict proliferation and induce apoptosis [33].

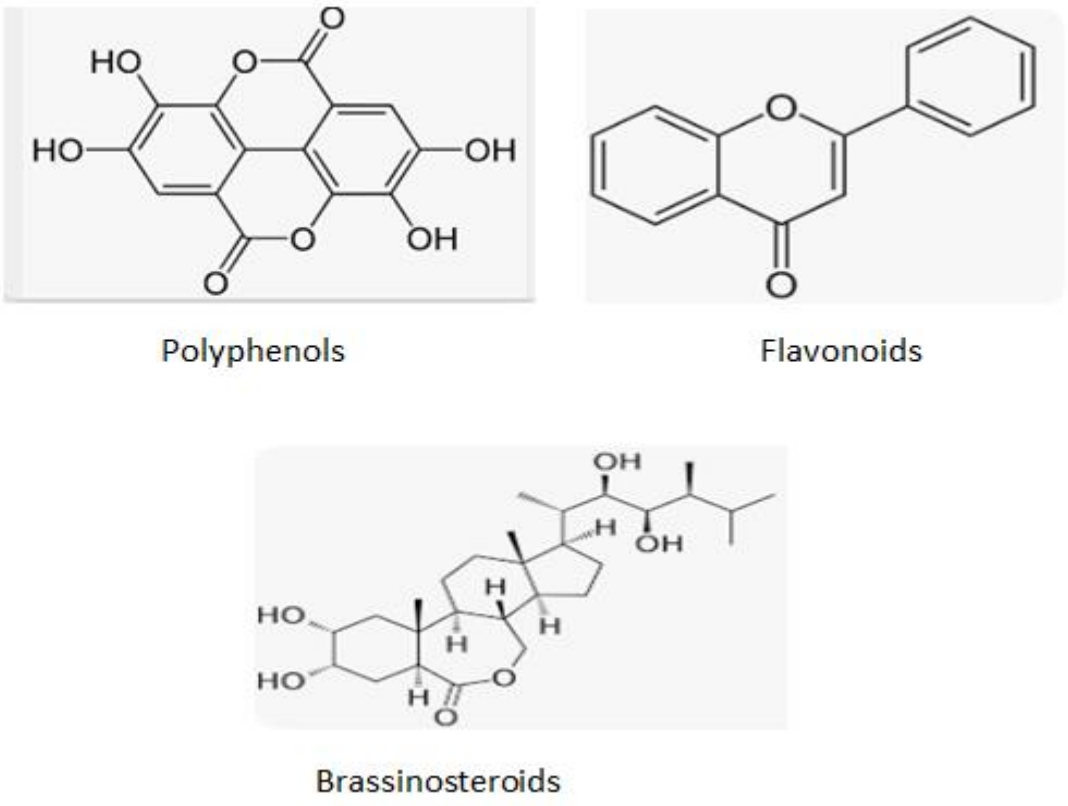


**Fig: 1 Plant derived compounds**

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### Plant-based medicines that fight cancer

Plant-based anticancer drugs are safe and accessible. Oral administration is simple [34]. They're also better for healthy cells since they're plant-based [35]. Taxanes, lectins, saponins, lignans, and cyanogenetic glycosides are exceptions [36,37] Plant-based drugs may go into clinical trials if studies show that they are selective, are safe for healthy cell lines, and kill cancer cells. Plant-derived drugs are methyltransferase inhibitors, DNA damage preventatives, histone deacetylase (HDAC) inhibitors, and mitotic disruptors.

### Enhancing pharmaceutical administration

Natural medicine developments are enabling new anticancer chemical application and dose approaches. A new drug must be administered well to replace chemotherapy. Nanotechnology is enabling the delivery of drugs using nanoparticles (NPs). Anticancer drugs that need high concentrations may have limited clinical development. NPs enhanced the anticancer effects of Aanascomosus bromelain [38].

### Demands for medicinal plants

A clinical trial favors plant-based drugs due of their effectiveness. Their cytotoxic effects on cancer cells and non-toxicity to healthy cells make them desirable. Most of the species studied were from poor African and Asian countries where herbal remedies and medicinal plants constitute the backbone of healthcare. The World Health Organization estimated 2007 plant-based drug sales at $100 billion. Commerce might reach $5 trillion USD by 2050. In rising countries, medicinal herb demand strains plant populations. For informal trade, some therapeutic plants are produced from wild populations, although this cultivation is uncontrolled [39]. The protection of medicinal plants is a concern that needs attention due to population increase, deforestation, and expanding urbanization [40]. High-value medicinal plants could go extinct if they are used too much because demand is going up. It is very important to protect these plants. Only some portions of wild medicinal plants are utilized as medicine, such as the bark of trees or the bulbs and tubers of bulbous and tuberous plants.

## CONCLUSION

Cancer is becoming more popular worldwide. The WHO claimed in 2007 that 7.6 million people died from cancer in 2005, most of them in poor countries. Cancer killed 1 in 4 In 2010, 1.5 million new cases were reported in the United States [41]. According to Cancer Research UK, 8.2 million people died from cancer in 2012, while 14.1 million were diagnosed. As a result, cancer treatment and prevention are critical. Other cancer treatments and chemical-based medicines exist. Chemotherapy may injure non-target tissues, worsening health problems. Thus, complementary treatments using naturally occurring anticancer compounds, preferably from plants, are needed. Due to increased demand for plant-based medicines, high-value medicinal plants are threatened. Rising populations, urbanisation, and deforestation threaten species in developing countries. Cryopreservation, tissue culture, and

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plant part replacement are needed to conserve these species 46. Large-scale medicinal plant cultivation and industrial utilization of raw byproducts may help conservation [42]. Plant-derived anticancer drugs inhibit cancer cell lines and are popular. Controlling these agents' exploitation helps satisfy demand and stay sustainable.

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