



REVIEW ON HERBAL DRUGS AS ANTICANCER AGENTS

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ABSTRACT :

Today Cancer poses a significant threat to public health in both industrialized and developing nations. Cancer is an abnormal growth of cells in the body that can be fatal, and the number of cancer sufferers worldwide is rising daily. It is an atypical cell proliferation in the Cancer is the leading cause of death worldwide, with rates rising daily. Many cancers can affect the lungs, skin, breast, rectum, stomach, liver, prostate, and oesophagus, among other organs. This kind of cancer may have internal causes including hormone problems, genetics, and weakened immune systems, as well as external causes like population growth, dietary habits, and industrialization.

Keywords : , cancer, Herbal drugs, Anticancer drugs,

INTRODUCTION :

Cancer is a leading cause of death, affecting more than one- third of the world's population. It is the leading cause of death in the world, accounting for more than 20% of all deaths. 1 In both developed and developing countries, cancer is a serious public health concern. It is a type of cancer in which the body's cells develop abnormally and cause death. Normal cells are generally invaded and destroyed by cancer cells. 2 Every year, more than 10 million new cases of cancer are scrutinized, according to the World Health Organization (WHO), and statistical trends predict that this number will double in the decades. 3 Cancer is the second prevalent cause of mortality worldwide, consumed the lives of 10 million people in 2020. The number of cancer diagnoses is predicted to increase by 50%, from 14 million to 21 million, while widely in conventional counseling. A variety of immunomodulatory and antioxidant properties, as well as anticancer properties, are known to be present in medicinal plants. These compounds stimulate

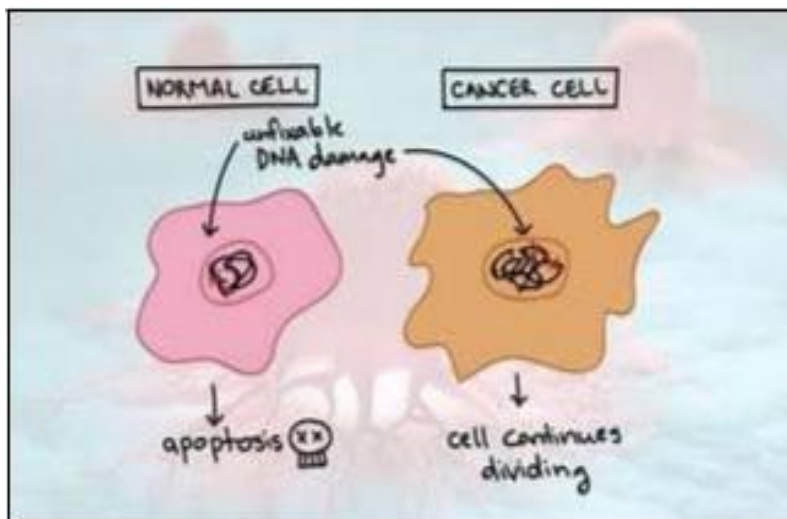
The term "cancer" is broad and can be divided into three categories:

- Anti-tumor – shown to be toxic to tumors in animal studies
- Cytotoxic – shown to fight tumors in laboratory cell cultures (in vitro)
- Anti-cancer – shown to fight tumors in human

CANCER :

Cancer is basically the result of unchecked cell division. Cells have a variety of systems in place to control cell division, fix damage to DNA, and stop the disease. Cancer is said to progress in several stages, because multiple processes need to fail prior to a crucial mass is attained, cancerous cells develop. These modifications encourage their growth, multiplication, and development into tumors. For example, cancer cells can cause angiogenesis, the formation of new blood vessels, which gives tumor cells oxygen and nourishment, and they can spread throughout the body by a procedure known as metastasis. Furthermore, Cancer cells do not go through programmed cell death, or apoptosis, death, whereas healthy cells would

Fig.1: Diagram illustrates how normal and cancerous cells react to situations that ordinarily cause apoptosis.



Furthermore, recent studies suggest that metabolic changes in cancer cells could promote increased cell division and development (see Figure 1 for details). It contrasts the responses of cancerous and normal cells to circumstances that typically result in apoptosis.

1. A healthy cell with irreversible DNA damage that will eventually die.
2. A cancer cell with irreversible damage to its DNA won't undergo apoptosis; it will continue to divide.

Signs, Symptoms of cancer :

Unexplained Weight Loss: Losing weight without trying can be a warning sign.

Fatigue: Persistent tiredness that doesn't improve with rest.

Pain: Ongoing pain in specific areas, such as the back or abdomen.

Changes in Skin: New moles, changes in existing moles, or any unusual skin changes.

Unusual Bleeding or Discharge: Blood in urine, stool, or abnormal bleeding from the vagina.

Persistent Cough or Hoarseness: A cough that doesn't go away or changes in voice.

Difficulty Swallowing: Trouble swallowing that lasts for a long time.

Lumps or Swellings: New lumps or changes in existing lumps, particularly in the breast, testicles, or lymph nodes.

Changes in Bowel or Bladder Habits: Persistent changes in bathroom habits, such as diarrhea or constipation.

Fever: Unexplained fevers, especially if they persist.

TYPES OF CANCER :

There are a hundreds of different types of cancer. But most common type of cancer are breast cancer, prostate cancer, lung cancer, cancer of colon or rectum, blood cancer, bladder cancer, ovarian cancer, brain cancer.

1) Cancers of Blood and Lymphatic Systems

- a) Hodgkin's disease, b) Leukemia's, c) Lymphomas,
- d) Multiple myeloma, e) Waldenstrom's Diseases

2) Skin Cancers : a) Malignant Melanoma

- a) Esophageal cancer b) Stomach cancer c) Cancer of pancreas
- d) Liver cancer e) Colon and Rectal cancer f) Anal cancer

4) Cancers of Urinary system :-

- a) Kidney cancer b) Bladder cancer c) Testis cancer d) Prostate cancer

5) Cancers in women :-

- a) Breast cancer b) Ovarian cancer c) Gynecological cancer d) Choriocarcinoma

6) Miscellaneous cancers:

- a) Brain cancer b) Bone cancer c) Carcinoid cancer d) Nasopharyngeal cancer
- e) Retroperitoneal sarcomas f) Soft tissue cancer g) Thyroid Cancer.

• Pharmacologically Active Anti-Cancer Herbal Plants :-

Herbal remedies are becoming more commonly accepted as complementary and alternative therapies due to growing scientific data from clinical studies and biological study for the purpose of cancer treatment. The development of anti-cancer There are numerous drugs made from herbal remedies as well as the use of certain of them in therapeutic situations in place of conventional anti-cancer drugs. To be precise, the creation of medications to treat cancer has been facilitated by the investigation of herbal treatments. To generate original singular, pure-molecule anti-cancer treatments, studies have The attention has been on cues from the conventional the application of herbal treatments. A significant part of the creation of effective therapeutic medicines is medicinal plants. Approximately 80% of people in poor

nations still rely on conventional methods today. Medication derived from plant species. An abundance of pharmacological research conducted in cutting-edge nations like China, Germany, France, Japan, and the United States has significantly raised the standard of natural remedies utilized for cancer therapy. Since the beginning of time, Herbs have long been valued for their ability to cure and relieve pain, talents, and we continue to mainly rely on the curative characteristics of plants. Medicinal plants are thought to contain a wealth of kinds of bioactive substances with a range of medicinal attributes. Plants' medicinal potential has been well-established, investigated over a very lengthy time span. The enormous variety of Paraphrase without limits. Herbal medications are often made using a conventional formulation that includes a number of ingredients, including triterpenoids, flavonoids, a glycoside that resembles saponins, or flavonoid glycosides coumarin derivatives, such as liquiritin and rhamnoliquirtin such as herniarin. Various arrangements have spasmolytic qualities and beneficial effects on the ulcers' healing process. Additional medicinal qualities of Herbal remedies for inflammation and allergies include antiviral, antihepatotoxic, antiarthritic, antiestrogenic, and anticholinergic effects. But herbal medicine is hindered by its authenticity and frequently by its quality. Within additionally, our scant comprehension of their biology activities and the healing process's sluggish progress have Regarding the advancement of herbal medication development for pharmacological uses. However, there has been a lot of interest and research in this field due to the recent development of herbal medicine for the prevention or treatment of cancer region.

- **Medicinal plants with anticancer Activity :-**

Most naturally occurring substances used in medicine come from plants. among general, cancer incidence is lower among communities that consume large amounts of natural herbal items. One example of a substance that may have anticancer properties is saponins, which are primarily found in soybeans. Plant screening for potential use in cancer treatment and prevention has gained a lot of attention recently. Consequently, a wide range of plant extracts have been investigated. This research focuses on screening conventional employed therapeutic herbs with anticancer properties.

- **List of herbal anticancer drugs :-**

1. Turmeric
2. Vinca
3. Neem
4. Ginger
5. Tulsi
6. Garlic

- **Detailed Study Of Medicinal Herbs :-**

1) Turmeric: (Haldi)



Fig No :- Turmeric

Synonyms : Curcuma, Haldi, Indian saffron .

Biological source : It is dried as well as fresh rhizomes of plant curcuma longa linn.

Family :- zingiberaceae

Chemical constituents: Turmeric has hundreds of molecular constituents ,each with a variety of biological activities .for,Instantly , there are at least 20 molecules that are antibiotics, 14 that are known cancer preventatives , 12 that are Anti-tumour ,12 are anti-inflammatory and there are at least 10 different antioxidants. Three gold coloured alkaloids called curcuminoids-curcumin,

Geographical source :In Indian Tamilnadu, Andhra Pradesh, Kerala, chain, Bangladesh, Myanmar, north australia.

Uses :

1. It has anti-neoplastic properties.used in the treatment of skin cancer .
2. Curcumin is a major biological active compound that prevents cancer cell growth.
3. It is used as spice also coloring agent
4. It has antioxidant, anti inflammatory, Antitumor properties used in the treatment of lung and breast cancer.

Mechanism of action :

Anti-inflammatory Effects: Curcumin inhibits various inflammatory cytokines and enzymes, which can help reduce inflammation associated with cancer progression.

Antioxidant Activity: It scavenges free radicals and enhances antioxidant defenses, potentially reducing oxidative stress that can lead to cancer development.

Cell Cycle Regulation: Curcumin has been shown to affect cell cycle regulators, which can slow down the proliferation of cancer cells and promote apoptosis (programmed cell death). **Modulation of Signaling Pathways:** Curcumin influences several key signaling pathways involved in cancer, such as the NF- κ B, MAPK, and PI3K/Akt pathways, which play roles in cell survival, proliferation, and metastasis.

Angiogenesis Inhibition: It may inhibit the formation of new blood vessels (angiogenesis) that tumors need to grow.

Chemosensitization: Curcumin has been shown to enhance the effectiveness of certain chemotherapy drugs, potentially making cancer cells more susceptible to treatment.

Epigenetic Modulation: Curcumin can influence gene expression through epigenetic mechanisms, potentially reversing abnormal gene regulation associated with cancer

Types of cancer treated :

Leukemia, glioblastoma and colon cancer (In vitro),lung,breast28,prostate,cervix and larynx cancer

2) Vinca : (periwinkle)



Fig no : vinca

Synonyms : periwinkle, vincarosea

Biological source: The dyed entire plant and areal part of catheranthusroseus line .

Family :apocynace

Chemical constituents : Rosinidin is an anthocyanidin pigment found in the flowers of catheranthusroseus vincristine and vinblastine, chemotherapy medications used to treat a number of types of cancers , are also found in the plant.

Geographical source : The plant is a native of Madagascar.it is cultivated in Indian, south africa, europe, Australia and Caribbean island as ornamental plant as well as for its medicinal properties.

Uses :

1. Vinca alkaloids induce programmed cell death i.e. Apoptosis and prevent formation of new blood vessels i.e. Angiogenesis.
2. Vinblastine is an Antitumour alkaloid used in the treatment of Hodgkin's disease.
3. Vincristine is used to treat leukaemia in childrens
4. It is used to relieve muscle discomfort and treat central nervous system depression.

Mechanism of action :

Microtubule Inhibition: Vinca alkaloids bind to tubulin, a protein that forms microtubules. By binding to tubulin, they prevent the assembly of microtubules, which are essential for mitotic spindle formation during cell division.

Disruption of Mitosis: The inhibition of microtubule assembly leads to the disruption of the mitotic spindle, causing cell division to be halted in metaphase. This is because the chromosomes cannot be properly segregated to daughter cells.

Induction of Apoptosis: The inability to complete mitosis triggers cellular stress responses and can ultimately lead to programmed cell death (apoptosis).

Types of cancer treated :

Hodgkin's disease, non- Hodgkin's lymphoma ,pancreas, testis, breast, lung, bladder and the cervix cancer, acute lymphocytic leukaemia, Wilm's tumour,neuroblastoma, rhabdomyosarcoma.

3) Neem : (Margosa)



Fig no : Neem

Synonyms : neem tree, Indian lilac

Biological source : It consist of the fresh or dried leaves and seed oil of azadirachta indica J.

Family : Acanthaceae

Chemical constituents : The active ingredient are Azadirachtin,salannin.neem leaves contain nimbosterol. Seeds contain Azadirachtin, salannin, Melianrol.The trunk bark contains nimbin,nimbidin, nimbosterol.

Geographical source : It found in India, pakistan, South Africa,east Africa, Thailand **Uses :**

1. Boosts immune system
2. It have antiinflammatory,antifungal, properties limonoides
3. Used in breast cancer,lung cancer,liver cancer Also used in prostate cancer.

Mechanism of action :

Antioxidant Activity: Neem contains various phytochemicals that act as antioxidants, helping to neutralize free radicals and reduce oxidative stress, which can lead to cancer development. **Anti-inflammatory Effects:** Chronic inflammation is associated with cancer progression. Neem's anti-inflammatory compounds may help mitigate inflammation and inhibit pathways linked to tumor growth.

Induction of Apoptosis: Neem extracts have been shown to induce apoptosis in cancer cells, promoting programmed cell death while sparing normal cells.

Cell Cycle Arrest: Neem may interfere with the cell cycle of cancer cells, inhibiting their proliferation and preventing them from dividing.

Inhibition of Angiogenesis: Some studies suggest that neem can inhibit the formation of new blood vessels (angiogenesis) that tumors need for growth, thus limiting their nutrient supply. **Immunomodulation:** Neem may enhance immune system responses, helping the body to recognize and destroy cancer cells more effectively.

Inhibition of Metastasis: Certain compounds in neem may inhibit the invasion and migration of cancer cells, reducing the risk of metastasis.

Synergistic Effects with Chemotherapy: Neem may enhance the effectiveness of conventional chemotherapy agents and help mitigate their side effects.

Types of cancer treated :

Breast Cancer, lung cancer, stomach cancer, prostate cancer,colony cancer.

4) Ginger (Adrak)



Fig.no : ginger

Synonyms : zingiber, zingiberis, sunthi.

Biological source : It consists of dried rhizome of zingiber officinal rosc.

Family: Zingiberaceae

Chemical constituents : starch, fat, fibre, monoterpin, hydrocarbons sequiterpene hydrocarbons oxygenated mono and sequiterpens and phenyl propanoids.

Geographical source : Ginger is native to South East Asia though it is cultivated in Caribbean island, Africa, Australia,Taiwan more than 35% of world's ginger is produced in India.

Uses :

1. Zinger decreases the side effects of chemotherapy and radiotherapy.

2. Zinger stops cancer cell growth causes cell death through the activation of Bax
3. Used as carminative stimulant
4. Zinger shows antimutagenic, antiinflammatory, and antioxidants properties.
5. Zinger prevents growth and spread of cancers such as colon, rectum, ovary, liver.
6. Ginger inhibit cancer cell proliferation and cell progression.
7. Ginger contains compounds like gingerol that have Antiinflammatory effects,which may help to reduced inflammation associated with cancer.

Mechanism of action :

Ginger, particularly its bioactive compounds like gingerol and shogaol, has shown potential in cancer therapy through several mechanisms:

Antioxidant Activity: Ginger has strong antioxidant properties, which help reduce oxidative stress and protect cells from damage, potentially preventing cancer initiation and progression. **Anti-inflammatory Effects:** Chronic inflammation is linked to cancer development. Ginger's anti-inflammatory compounds may help inhibit inflammatory pathways and reduce the risk of tumor growth.

Apoptosis Induction: Some studies suggest that ginger extracts can induce apoptosis (programmed cell death) in cancer cells, promoting the elimination of malignant cells while sparing healthy ones.

Inhibition of Tumor Growth: Ginger may inhibit the proliferation of cancer cells by interfering with signaling pathways involved in cell cycle regulation and growth. **Angiogenesis Suppression:** Ginger may hinder the formation of new blood vessels (angiogenesis) that tumors need to grow, thereby limiting their nutrient supply.

Enhancement of Chemotherapy: Some research indicates that ginger can enhance the efficacy of certain chemotherapy drugs, making cancer cells more susceptible to treatment. **Modulation of Drug Resistance:** Ginger may help overcome resistance mechanisms in cancer cells, making treatments more effective.

Types of cancer treated :

Liver Cancer, ovary cancer, urinary cancer, prostate cancer.

5) Tulsi (Holy basil)



Fig no : Tulsi

Synonyms : Holy basil, Tulasi.

Biological source : Tulsi consists of fresh and dried leaves of ocimum species like ocimum sanctum and Linn and ocimum basilicum linn.

Family : Lamiaceae

Chemical constituents : volatile oils eugenol(70%),carvacrol(3%),linolenic Acid,eugenol-methyl-ether(20%),Rosmarinic Acid, flavonoids,ursolic Acid, Apigenin Luteolin,o-glucuronide, orientin.

Geographical source : Tulsi is found in North South India.it is native to tropical Asia, Africa,and America and widely cultivated in pots and gardens in Europe,and USA.

Uses :

1. Used in Breast cancer,liver cancer and sarcoma.
2. Tulsi have Immunomodulatory and Antioxidant activity.
3. It contains phyto-chemicals which provide all these beneficial effects.
4. Tulsi is a home remedy use to treat cold, headache,cough, fever,sore throat,insomnia.
5. Ocimum sanctum has Antitumour, Immunomodulatory properties and decreases side effects of radiotherapy and chemotherapy.

Mechanism of action :

Antioxidant Activity: Tulsi is rich in antioxidants that help neutralize free radicals, reducing oxidative stress and potential DNA damage, which can lead to cancer.

Anti-inflammatory Effects: The anti-inflammatory properties of tulsi can inhibit the production of pro-inflammatory cytokines and mediators, which are often associated with cancer progression.

Apoptosis Induction: Some studies suggest that tulsi extracts may promote apoptosis (programmed cell death) in cancer cells, helping to eliminate abnormal cells.

Inhibition of Tumor Growth: Tulsi may impede the proliferation of cancer cells by interfering with their growth signaling pathways, potentially slowing tumor development.

Immune System Modulation: Tulsi can enhance the immune response, which may help the body fight cancer more effectively.

Chemopreventive Properties: Certain compounds in tulsi may protect against the initiation and promotion of cancer by modulating various biochemical pathways.

Types of cancer treated :

Breast Cancer, liver cancer, tissue protective, fibrosarcoma.

6) Garlic (lasun)

Fig no : garlic

Synonyms : Allium sativum

Biological source : it consists of the fresh or dried bulbs of Allium sativum. It contains not less than 0.2% of allin on a dried basis.

Family : Liliaceae

Chemical constituents : garlic contains 29 % of carbohydrates about 56 % of proteins (albumin 0.1% of fat, mucilage, and 0.6 to 0.1 % of volatile oil. It also contains phosphorus iron and copper. volatile oil of drug is the chief active constituents and contains allyl propyl disulphide, alliin and alliin .alliin by action of enzyme alliinase is converted into alliin .

Geographical source : garlic is cultivated in central Asia southern Europe USA and India in India it is found in almost all the states and cultivated as a spice.

Uses :

1. Boosts the immune system
2. Garlic decreases the risk of prostate cancer.
3. Garlic may help you live longer
4. Garlic can directly inhibit the growth of cancer cells .
5. Garlic seems to detoxify chemical carcinogens
6. Garlic are used as a remedy for respiratory problems.

Mechanism of action :

1. Antioxidant properties : garlic contains Antioxidants that help reduce oxidative stress, which can damage cells and lead to cancer development.
2. Anti-Inflammatory effects : chronic inflammation is a risk factor for Cancer garlic anti inflammatory properties may help reduce this risk .

3. Induction of Apoptosis : some studies suggest that compound in garlic.
4. Inhibition of tumor Angiogenesis : garlic may prevent the formation of new blood vessels that tumors need to grow thereby inhibiting tumor expansion.
5. Immune system modulation : garlic can enhance the immune response, helping the body to recognise and attack cancer cells more efficiently.

Type of cancer treated :

Lymphoma, cervix cancer(in vivo), Breast cancer, prostate cancer,colon cancer.

Advantages of herbal drugs :

1. Low / minimum cost
2. More protection
3. Enhanced tolerance
4. Potency and efficacy is very high
5. Complete accessibility
6. Fewer side effect
7. Variety of formulation
8. Promoting preventative care

Conclusion :

Medicinal plants have a significant role in maintaining human health. Plants and plant extracts contain phytoconstituents that have anticancer properties. Cancer patients may benefit most from herbal medication. Some of the plants that exhibit anticancer action against different forms of cancer are listed in this review. Others who wish to analyze plants further can benefit from this review. as well as its application in additional toxicity and illness research

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