

## A Review On:- Anticancer Herbal Drugs

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### ABSTRACT:

The word "cancer" refers to a broad category of illnesses that differ in kind and location but share the characteristic of aberrant cells proliferating uncontrollably. It keeps growing unchecked, and the accumulation of aberrant cells leads to the formation of a mass of cells known as "cancer". Natural secondary metabolites from the kingdom of plants are being studied for their potential to treat cancer, with the goal of creating novel therapeutic agents. Plant-derived anticancer drugs such as vinca alkaloids, Taxans, Podophyllotoxin, and camptothecins have been employed in therapeutic settings. As a result of the effectiveness of these substances, which have been transformed into mainstay medications for the treatment of cancer, new technologies are emerging to advance the field. nano particles for nano medicines are one example of new technology that aims to improve the anticancer properties of medications produced from plants by regulating the compound's release and exploring novel delivery strategies. This concise review aims to compile recent research on various herbal medications with a particular emphasis on their advantageous functions and therapeutic targets in cancer treatment and chemoprevention. The literature that has been published thus far on herbal medicine utilised as anti-cancer medications is summarised in the current review.[1]

**Keywords:** Cancer, Herbal drugs, Anti-cancer drugs, cell cycle.

### I. INTRODUCTION:

Over one-third of people worldwide are affected by cancer, which is one of the main causes of mortality. With almost 20% of all deaths coming from it, it is the primary cause of death globally. Cancer is a major public health concern in both industrialised and developing nations. It's a kind of cancer where the body's cells grow erratically and eventually kill the patient. Cancer cells typically infiltrate and kill normal cells. The World Health Organisation (WHO) estimates that about 10 million new instances of cancer are examined annually, and statistical trends indicate that this

number will treble in the coming decades. In the world, cancer is the second leading cause of death; 10 million people died from it in 2020. It is projected that the number of cancer deaths will increase from 8 million to 13 million, a 60% increase, while the number of diagnoses will increase by 50% from 14 million to 21 million. The most common causes of cancer-related mortality are lung cancer (1.69 million deaths), stomach cancer (754000 deaths), colorectal cancer (774000 deaths), liver cancer (788000 deaths), and breast cancer (571000 deaths). In the coming decades, there will likely be a 70% increase in the number of cancer cases, with low- and middle- income countries accounting for the majority of cancer-related deaths.

It is quite challenging to determine the precise cause of cancer. Some of the most well-known causes of this illness are customs, lifestyles, alcohol consumption, tobacco use, and environmental toxins. Since ancient times, medicinal plants have been used as a significant therapeutic assistance in the treatment of human illnesses. An estimated 80–85% of people on the planet receive their primary medical care from traditional practitioners. requirements, and it is anticipated that a significant portion of traditional therapy would make use of plant extracts or bioactive components. It is well recognised that medicinal plants have a broad spectrum of antioxidant and immunomodulatory properties in addition to anticancer properties. These compounds promote both specific and non-specific immunity. They may strengthen the host's defences against infection by training the body tissues and restoring physiological equilibrium. Lead components that can prevent cancer from spreading are being found by utilising the anticancer qualities of several medicinal plants. Flavonoids, alkaloids, terpenoids, and steroids are examples of secondary metabolites found in medicinal plants. Each of these compounds has unique pharmacological properties. A number of medicinal plants appear to have potential for preventing the growth of cancer cells. Consequently, this review offers a summary of the many therapeutic plants and their main bioactive

components that are utilised to treat cancer.[2]



Fig no.1 Types of Cancer.

#### Cancer :

The word "cancer" refers to a broad category of malignant illnesses that can affect various bodily sections. Rapid and uncontrollably growing aberrant cells, which can aggregate to form a growth or tumour or spread throughout the body, causing aberrant growth at other locations, are the hallmarks of these disorders. If the process is not stopped, it can continue until the organism dies. Surgery, radiation therapy, and pharmaceuticals (cancer chemotherapeutic agents) are the primary treatment modalities for advanced stage cancer in humans. Chemotherapeutic drugs for cancer can sometimes lead to a cure as well as life extension and momentary symptom relief. The synthesis of possible anticancer medicines has received a lot of attention in recent years. Though they have greater adverse effects, many hundreds of chemical variations of the known class of cancer chemotherapeutic drugs have been synthesised. An effective anticancer medication should destroy or severely harm cancer cells without endangering healthy cells. Because this goal is hard, if not impossible, to achieve, cancer patients often experience severe side effects from their treatment. Nonetheless, a wasteful amount of artificial labour has produced just marginal advancements over the experimental medications. Natural goods are supplying the fresh prototypes and templates that are needed to continue designing possible chemotherapeutic medicines. Recent research on compounds derived from plants that suppress tumour growth has produced a remarkable variety of new forms.[3]

#### • Classification of cancer:

- 1) Cancers of Blood and Lymphatic Systems
  - a) Hodgkin's disease, b) Leukemia's, c) Lymphomas, d) Multiple myeloma, e) Waldenstrom's disease
- 2) Skin Cancers
  - a) Malignant Melanoma
- 3) Cancers of Digestive Systems
  - 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) Characinoid cancer
  - d) Nasopharyngeal cancer e) Retroperitoneal sarcomas f) Soft tissue cancer g) Thyroid cancer[4]

#### Development of Cancer:

Numerous diverse methods exist in cells to limit cell reproduction, fix damage to DNA, and stop the growth of cancer. Because cancer develops in a multi-step process, in which numerous mechanisms must fail before a critical mass is reached and cells become malignant. In particular, the majority of cancers start when cells experience a sequence of mutations (alterations in DNA) that cause them to proliferate faster, evade external and internal constraints on division, and elude planned cell death. Cancer-causing mutations are depicted in Figure 2. A negative cell cycle regulator is rendered inactive by an initial mutation. A novel mutation occurs that causes an overactive positive cell cycle regulator. A third mutation occurs in one of this second cell's offspring, rendering a genome stability component inactive. Additional mutations quickly accumulate in the progeny of the cell if the genome stability factor is deactivated (since mutations are no longer avoided or repaired as efficiently). A cell is considered to have malignant traits (uncontrolled division, evasion of apoptosis, capacity for metastasis, etc.) after a threshold mass of mutations impacting important processes is reached. One of the leading causes of death and illness in the world, cancer is predicted to affect 21 million people by 2030 due to its continuous rise in

instances. It is predicted that there will be over 600,920 cancer deaths and 0 new cancer diagnoses in the United States alone in 2017.[1]

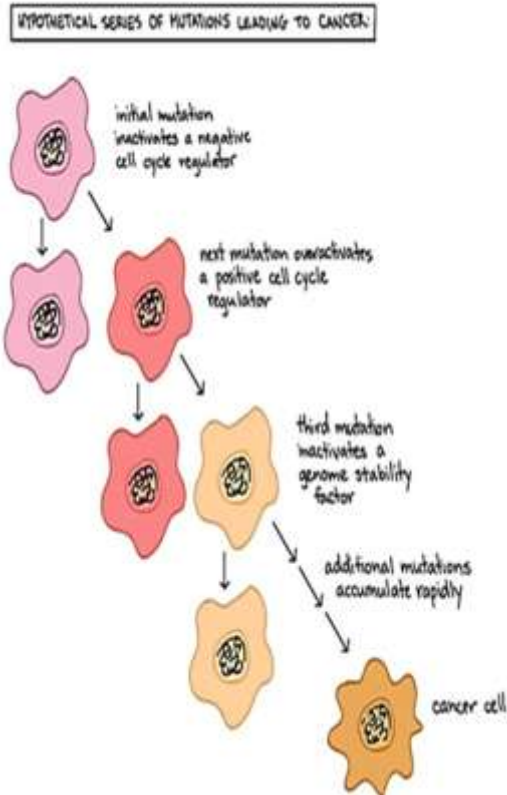


Fig no.2 Mutations leading to cancer cell

**Stages of cancer:**

"Staging" is a crucial factor in assessing the cancer's severity. Drug recommendations might be made for patients based on their cancer's stage. Cancer manifests itself in four stages, each with unique characteristics and symptoms. These are totaled as follows:

STAGE 1: The initial stage of cancer, during which there are no outward signs. The tumour has not reached full size. A standard physical examination can assist in identifying early-stage cancer. It would be simpler to treat cancer if it were discovered at this stage.

STAGE 2: In this instance, scans clearly show the cancer. A few obvious signs exist. STAGE 3: The benign tumour has fully developed and is exhibiting symptoms.

STAGE 4: At this point in the disease's progression, there is no chance of recovery. The tumour has metastasized, or spread, to other places of the body. Cachexia, which is characterised by abrupt and dramatic weight loss, and skin cancer

patches are both apparent indicators. [6]

**Causes of cancer:**

The main factors contributing to the various types of cancers shown in Figure 3-4 are the use of natural tobacco smoke, or passive smoking, poor eating habits, inactivity, alcohol consumption, exposure to ionising radiation, environmental contaminants, hepatitis, and genetic flaws inherited from one's parents. In developed countries, unhealthy eating habits and a sedentary lifestyle account for almost as many disease cases as smoking. Tumours of the colon, breast, uterus, oesophagus, and kidney are associated with obesity. Certain illnesses are caused by organic agents that can cause cancer, such as infections (hepatitis B/C and liver cancerous growth, human papilloma virus [HPV] and cervical cancerous growth), microorganisms (Helicobacter pylori and gastric cancerous growth), and parasites (schistosomiasis and bladder cancer). Moreover, excessive alcohol consumption has been linked to certain cancerous growth forms, such as throat, oesophageal, head and neck, and bosom diseases.[7,8,9]

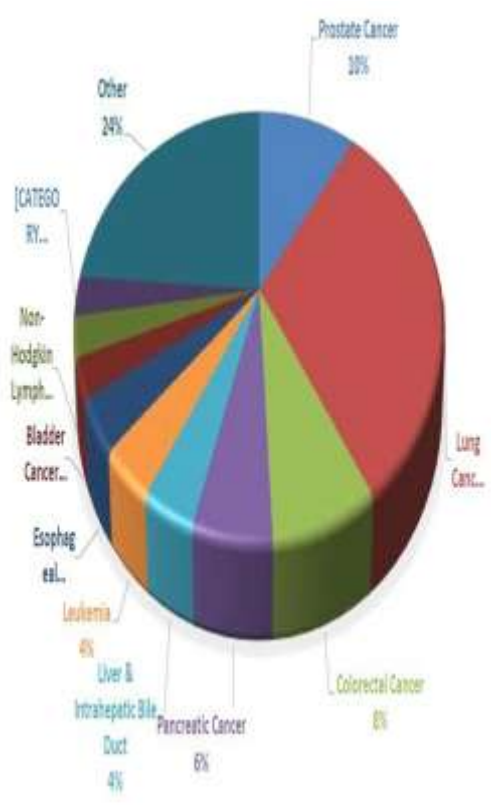


Fig no.3 Cancer Mortality in Males

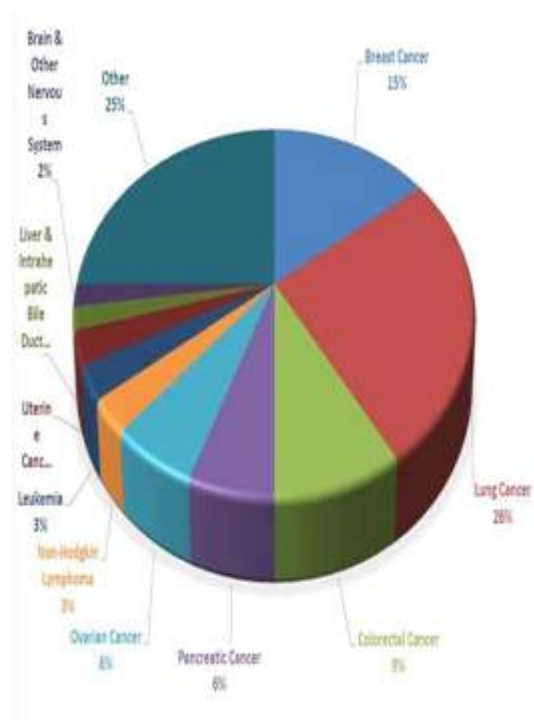


Fig no. 4 Cancer Mortality in Females.

The various cancer growth inhibitors that are available include immunotherapy, chemotherapy targeted treatment, radiation therapy, and surgery, each of which has unique physiological effects.

Herbal medicine will continue to be a beneficial replacement for modern therapies going forward. The following are the main justifications for using natural remedies rather than manufactured ones:

1. As compared to synthetic treatment, there will be fewer symptoms.
2. Less will be the impact of dose variation.
3. Natural products will be less expensive financially.
4. They will be widely available.
5. These break down by biodegradation.
6. The synthesis of herbal goods won't involve any laborious stages.
7. The synthetic therapy might or might not result in a full recovery.

Herbal treatment for cancer avoids many of the physical side effects of many disease-causing pharmaceuticals, such as radiation, chemotherapy, and other artificial treatments, such as pain, nausea, heaving, weariness, weakness, lymphedema, ripening problems, and ostomies.

### Some Drugs used as Herbal Anticancer Agents:

#### 1) Ashwagandha.



- Synonyms: winter cherry, ajagandha
- Family: solanaceae
- Biological source: roots of withnia sominifere
- Uses:
  1. used to treat diabetes and asthma
  2. It has ingredients that reduce edoema.
  3. There is insufficient data to support the use of adaptogens to prevent vomiting and upset stomach.

For the first time, we demonstrate that ashwagandha plants contain TEG, which activates humour and selectively damages cancer cells. Cell therapy may show to be quite helpful for cancer patients.[10]

#### 2) Aloe vera.



Synonyms : kumari , korphad

Biological source: aloe is the fresh latex of leaves of aloe barbadensis miller. Family : liliaceae (asphodelaceae)

Chemical constituent: Resin (16–37%), emodin, volatile oil, aloin (4–5%), and curacao aloe (18–25%), are among the crystalline glycosides found in aloe. Like barbaloin (aloe-emodin anthrone c-10 glucoside), it also contains anthraquinone

glycosides. B-barbaloin, iso-barbaloin, and chrysophanic acid.

Uses: include the therapy of acne, burns or skin irritations, hepatocellular carcinoma, human bladder cancer cells, and anthraquinone death quantity.[11]

### 3) Digitalis.



Synonyms : Digitalis purpurea ,Foxglove-Flower

Biological Source: It is obtained from the herbaceous plant of Digitalis purpurea. Family : Scrophulariaceae

Chemical Constituents: comprises three significant main glycosides, Purpurea glycosides A, B, and C, which hydrolyze to produce, in that order, digoxin, gitoxin, and gitalin. Digoxigenin and its derivatives, tannins, fatty acids, gallic, formic, acetic, succinic, and benzoic acids, and the enzyme digipuridase, which is the only one capable of hydrolyzing purpurea glycosides are all present.

Uses : potent anticancer potential. A 2003 study conducted in Spain examined the purpurea strain's cytotoxic effects on human cancer cells in its leaves.[12]

### 4) Saffron.



Synonyms : Crocus, Spanish saffron, French saffron.

Biological Source: Saffron is dried stigma and styletops of Crocus sativus Linn.Family : Iridaceae

Chemical Constituents: Numerous carotenoids coloured compounds are present in it, including crocin-II, lycopene, zeaxanthin, safranal, picrocrocin (colourless bitter glycoside), crocetin, gentiobiose,  $\alpha$  and  $\beta$  carotenes, and ester of crocin (colour glycosides). It includes wax, fixed oil, volatile oil, etc.

Uses : Crocetin is a carotenoid component found in saffron. Research findings indicate that this chemical possesses the potential to be an effective anti-tumor drug, both in vivo and in vitro. Another study discovered that saffron prevented skin cancer in mice.[13, 14]

### 5) Turmeric



Synonyms : Curcuma longa, Haldi, Haridrai

Biological Source: It is a dried root obtained from the perennial plant of Curcuma longa

Family : Zingiberaceae

Chemical Constituents: Three gold-colored alkaloids called curcuminoids—Curcumin, Dimethoxy-curcumin, and Bisdemethoxy-curcumin—are found in turmeric. Roughly 95% of curcuminoids are present (just 3–5% are in turmeric). 70% carbs, 7% protein, 4% minerals, and at least 4% essential oils make up the rhizome. In addition, it contains vitamins, various alkaloids, and roughly 1% resin.

Uses : Antibiotic molecules number at least twenty. There are 14 chemicals that are known to prevent cancer. 12 compounds are anti-tumor. There are 12 anti-inflammatory compounds.[15]

6) **Vinca**



- Synonym: periwinkle, madagascarperiwinkle
- Biological source: the dyed entire plant and areal part of *Catgarranthus roseus* line
- Family: apocynaceae
- Uses: It is used to relieve muscle discomfort and treat central nervous system depression [10].

## II. CONCLUSION:

Herbal products have been identified as a major cause of several cancer forms. Many of which include eating in daily life. Several of the herbal anticancer medications on the above list suggest changing one's lifestyle. Chemically generated drugs have been produced, and while various cancer treatments are already accessible, their toxic effects on non-targeted organs limit their applicability and increase human health difficulties. Examples of these treatments include chemotherapy. Consequently, there is a market for substitute cancer therapies that rely on naturally occurring anticancer compounds, with plants being the favoured source. Due to their immunomodulatory and antioxidant qualities, medicinal herbs have been shown to have strong anticancer potential. Whenever we discuss anticancer medicines, they are a major source of synthetic and/or herbal origin. Bioactive substances had a major impact on cancer research in a number of ways. In order to ameliorate the situation, researchers in the future need to focus on the scientific rigour of investigations on herbal medications. Out of 1000 species of medicinal plants, only a small number have been studied for their biological activity. Therefore, more research on the use of plants to cure cancer looks promising and has to be taken into account.

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