

## Anticancer activity of Herbal plant extract-A review

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### ABSTRACT

For a very long time, traditional medicine has helped people all over the world. India is unquestionably a centre for herbs. Native Indian medicinal herbs and their use in diverse traditional medical systems certainly inspire awe. The study of ethnobotany and the common plants offer a wealth of information for the creation of natural medicines. Information on plant research used in traditional medicine has attracted a lot of attention in recent years. Numerous phytochemicals, including vitamins, carotenoids, terpenoids, flavonoids, polyphenols, alkaloids, tannins, saponins, enzymes, minerals, and others, are found in therapeutic plants. These phytochemicals have antioxidant properties that help either prevent or cure numerous illnesses, including cancer.

In India, among other countries, there are a number of medicinal plants that have been used for centuries as cancer preventive and therapy. The current article is an in-depth analysis of several literature sources. The potential of many medicinal plants to treat various forms of carcinomas is discussed in the study.

**Keywords** Medicinal plants, cancer, anticancer activity.

### I. INTRODUCTION

Herbal medicine has grown in significance over the past few decades, having an effect on both worldwide health and trade. Large segments of the global population's healthcare system still heavily relies on medicinal plants. This is especially true in poorer nations, where the use of herbal therapy has a long and continuous history. Both developing and industrialised countries are increasingly recognising and developing these plants' therapeutic and economic advantages. A considerable section of the population in developing nations consistently uses herbal medicine, primarily as a result of the high expense

of western drugs and healthcare.<sup>4</sup> Cancer, which is perhaps the most significant hereditary illness, is one of the human diseases treated using medicinal herbs. Millions of people receive cancer diagnoses each year, which in the majority of cases results in death. The American Cancer Society estimates that between 2 and 3% of all yearly fatalities reported globally result from cancer. Breast cancer is the second most frequent disease among South African women, and the most common cancer in women globally. Cancer rates are rising every year in South Africa. According to recent figures, one in every 31 women in this country, regardless of ethnicity, is predicted to acquire breast cancer.<sup>15</sup>

In the Eastern Cape of South Africa, several herbalists and traditional healers have long used a variety of medicinal plant species to cure cancer patients. Despite the Province's long history of employing herbal treatments to treat cancer, the expertise of these herbalists has not been scientifically verified. Oral tradition is the method through which knowledge of conventional herbal practise in the Province is transmitted from one generation to the next, claim Grierson and Afolayan. Accurate scientific documenting of the expertise and knowledge of these herbalists is required in light of the high rate of deforestation and loss of biodiversity.<sup>11</sup>

### CANCER

- It is a collection of illnesses brought on by a breakdown in cell cycle regulation.
- Uncontrolled aberrant cell proliferation is linked to cancer.
- Carcinogens are compounds that alter DNA and result in cancer.
- There are several genes that can mutate and lead to genomic instability (DNA damage) or loss of regulation of the cell cycle.
- Similar mutations.
- Removable organs

- Dedifferentiated cells lose their specialised characteristics.
- A distinct look that displays dedifferentiation
- Lack contact inhibition: will divide into a mass of cells and pile on top of one another Increased Metastasis (cells spreading to other sites in the body), Invasive.
- Increased mutation rate.
- Invasion (squeezing into any accessible area).
- Induction of local angiogenesis (formation of blood vessels).
- Metastasis (cells spreading to other sites in the body), Invasive.

### CAUSES OF CANCER

Your DNA becomes damaged or mutated, which starts cancer. Your DNA serves as a kind of manual for your cells, instructing them on how to expand and separate. DNA mutations occur often in normal cells, although most of these changes may be repaired. Or, if they're unable to correct the majority of these alterations. Or, the cells frequently perish if they are unable to complete the repairs. However, certain mutations aren't corrected, which prompts the cells to proliferate and become cancer. Cancer cells also survive longer than normal cells do as a result of mutations. The malignant cells start to gather as a result.<sup>13</sup> The commonly recognised estimate that 80 to 90 percent of human cancers are caused by environmental causes is the outcome of decades' worth of research. The twin study has been the gold standard for differentiating between genetic and environmental features (Robert N. Hoover, M. D., National Cancer Institute NEJM-2000). Environmental influences, which include radiation and toxins in our homes and workplaces as well as smoking, food, and infectious illnesses from a scientific perspective.

### NATURAL PRODUCTS

The bulk of the world's population relies on medicinal plants as their only supply of life-saving medications. For many decades, medicinal plants have been utilised extensively to cure illnesses in a traditional manner. In order to produce new drugs, a relationship between conventional medicine and contemporary biotechnological techniques needs to be developed. The greatest method to find promising leads will be at the intersection of structural chemistry, in vitro tests, and cell biology. Less than 1% of the estimated 250000 higher plants have undergone pharmacological screening. Plant research has

received more attention recently all across the world. The goal of the current study is to examine the potential anticancer effects of historically used medicinal herbs.

A huge potential source of anticancer chemicals is medicinal plants. The significance of medicinal plants, as with all aspects of phytomedicine, rests in the potential access to extraordinarily complex molecular structures that would be challenging to synthesise in a lab. Compounds derived from medicinal plants that have antitumor properties may do so through a variety of mechanisms, including actions on cytoskeletal proteins that are essential for cell division, inhibition of DNA topoisomerase enzymes, antioxidant or antiprotease activity, immune system stimulation, etc. In an effort to create even more potent anticancer medicines, medicinal plants are still the focus of intense screening on a global scale.

### Azadirachta indica

Azadirachta indica, which is widely distributed in tropical nations. Since the time of the Vedic civilization, neem has been used therapeutically in many different ways in India. Since ancient times, almost all components of the tree have been used as traditional medicines for treating human illnesses. Although neem has been the subject of extensive investigation. There aren't enough investigations of molecular mechanisms including apoptosis induction and cell cycle analysis.

Although it's unlikely that even the most pessimistic researcher could have predicted the potentially life-saving treatments being identified now for preventing or treating multiple types of cancer, the National Research Institute's 1992 report on neem predicted that ongoing research into the components of a tree known in India as a village pharmacy would demonstrate useful cures for various ailments. Although human clinical trials are still a ways off, the early test tube and animal studies, together with neem's few side effects, widespread accessibility, and affordable price, are very encouraging.<sup>10</sup>

Due to its numerous medical virtues, Azadirachta indica, often known as neem, has gained fame on a global scale recently. Traditional remedies for inflammation, infections, fever, skin ailments, and dental problems include the usage of the whole neem tree. Neem leaf's therapeutic benefits have been specifically discussed. It has been proven that neem leaf and its compounds have

antibacterial, immunomodulatory, anti-inflammatory, antiulcer, antioxidant, and other beneficial characteristics. Phytochemicals such as azadirachtins, nimocinol, isomeldenin, nimbin, nimolicinol, odoratone, isoazadirone, azadirone, naheedine, and mahmoodine are responsible for the wide range of biological, pharmacological, and toxicological properties that have been observed, according to bioassay-guided studies and photochemical analyses using cutting-edge.

Neem includes a number of active substances that operate concurrently through several methods. This property explains why it is effective as a pesticide and appears to be the reason for its strong influence on cancer. Apoptosis (programmed cell death), which kills cancer cells directly to take over recognising and eliminating them as well, is one of these proven ways. This process is known as cross priming. Additionally, neem has been found to create much more antioxidants, including the glutathione enzyme that detoxifies carcinogens. Neem's boosting effect on the immune system is perhaps both the most significant and least unexpected.

Additionally, neem, or isolated chemicals, have demonstrated remarkable effectiveness against a range of human cancer cell lines and animal models for human malignancies, including colon, stomach, Ehrlich's carcinoma, lung, liver, skin, oral, prostate, and breast cancers.<sup>14</sup>

In addition to studies demonstrating the effectiveness of neem as a stand-alone treatment and demonstrating that pretreatment with neem is highly protective against cancer in animals (e.g., neem leaf given to mice reduced chemically induced tumours by up to 87%), two recent reports suggest that neem pretreatment also enhances the activity while reducing the side effects of some conventional cancer treatments.

### **Tinospora cordifolia**

Giloy is one of the most effective ayurvedic herbs. In addition to acting as a tonic and aphrodisiac, it has a number of other beneficial properties, including those of an antihelminthic, anti-arthritis, anti-periodic, anti-pyretic, blood purifier, cardiac, carminative, digestive, diuretic, and expectorant, as well as stomachic, rejuvenating, appetising, and anti-inflammatory properties.<sup>12</sup>

Because of its numerous medical benefits, Giloy is referred to as Amrita in Ayurvedic literature. It is also supposed to extend human life by shielding individuals from a number of chronic

illnesses. Chronic diarrhoea and dysentery can be treated using the starch found in the roots and stems of the Giloy plant. The juice of the new persistent fevers, gout, vomiting, cardiac afflictions, skin conditions, leprosy, cough, asthma, jaundice, seminal weakness, and splenopathy. In addition, utilised to lower cholesterol, protect the liver, and assist cancer therapy. It serves as a potent anti-aging agent. Tinosporin, perberillin, palmarin, berberine, tinosporon, and hepta consol tinosporic acid adntinosporol are the plant's principal chemical components. Giloin, giloinin, and gilosterol are produced by the fresh stem bark. From this plant, hypoglycemic agents and phenolic lignin have also been extracted. The identification of bioactive phytochemicals with chemopreventive properties against many illnesses, such as cancer and immunological disorders, has increased recently. Many plants have undergone experimental examination in order to provide a scientific basis for their therapeutic properties based on their Ayurvedic or herbal applications. Regarding this, Tinospora has a long history of usage against a variety of illnesses, such as spasms, inflammation, arthritis, allergy, diabetes, cardiac toxicity, and immunosuppression.

However, there is a paucity of scientific data supporting its biological activity. Numerous investigations have recently been conducted to validate the well-known properties of Tinospora as well as to uncover its innovative potential. These studies also showed Tinospora's anticancer and radioprotective properties.<sup>1</sup>

### **Triticum aestivum**

The chlorophyll concentration of wheatgrass, a unique variety of grass, is the greatest of any plant species at 70%; in reality, chlorophyll is plant blood with a structure remarkably similar to that of human blood. It is extremely abundant in enzymes and amino acids that are good for both plants and people. One ounce of wheatgrass juice is comparable to 2.5 pounds (that's a kilo) of fresh veggies because wheatgrass contains so much chlorophyll. Cell health is maintained in large part by natural nutrients, vitamins, minerals, and enzymes. In turn, healthy cells hinder the growth and spread of cancer cells. Natural detoxification qualities found in essential foods can help stop cancer. Over a hundred components that are good for people have been determined to be present in fresh wheatgrass juice. Wheatgrass is a genuinely complete diet, including a whole range of vitamins, minerals, amino acids, and enzymes in a form that

is simple to assimilate. In actuality, it is advised to consume wheatgrass on an empty stomach. Complex and prepared meals require less energy to digest, and your body may use the additional energy to speed up metabolism and promote tissue repair.<sup>2</sup> Superoxide dismutase (SOD), P4D1, abscisic acid, and chlorophyll are four more unique ingredients in wheatgrass that are very beneficial in the prevention of cancer.<sup>8</sup>

According to research, cancer cells have protective coverings that make it difficult for the immune system to recognise them, allowing them to thrive and reproduce out of control inside of the body. P4D1 also has an antiaging effect and is known to repair damaged DNA. Abscisic acid and P4D1 are substances that eat away the protective covering of cancer cells, rendering them susceptible to the immune system. The wheatgrass roots contain both substances. In a similar way to liquid oxygen, chlorophyll creates an environment in the body that is rich in oxygen. The antiaging enzyme superoxide dismutase (SOD, an anticancer factor), which is also present in wheatgrass, has strong antioxidant activity to shield cells from harm brought on by illnesses, inflammation, irritants, toxins, radiation, and free radicals.

#### **Aloe barbadensis**

Aloe vera has been used for both therapeutic and curative purposes for many years. Although more than 75 active components from the inner gel have been found, the therapeutic effects of each particular chemical have not been properly connected. However, it is thought that these biological activities should be attributed to a synergistic action of the compounds contained therein rather than a single chemical substance. Many of the medicinal effects of aloe leaf extracts have been attributed to the polysaccharides found in the inner leaf parenchymatous tissue. The two aloe parts that are said to have an anti-cancer impact are polysaccharides and glycoproteins (lectins).

Numerous in vitro models and several animal species have been used to study the anti-tumor efficacy of polysaccharides derived from A. Vera, particularly acemannan. Various research have shown that A. Vera gel has anti-tumor action in terms of decreased tumour burden, tumour shrinkage, tumour necrosis, and longer survival rates. A. vera gel also has chemo preventive and anti-genotoxic effects on benzo[a]pyrene; these anticancer activities of aloe polysaccharides include the activation of the immune system.<sup>5</sup> Natural

elements hold the key to curing cancer; A. vera is well renowned for curing a wide range of illnesses, including cancer. This organic compound has the potential to deliver the therapeutic benefits of aloe vera to our bodies' farthest-reaching receptors when combined with bees' honey. 'Aloe barbadensis' is the best species that has reached the age of flowering.

Grappa enlarges the blood vessels, allowing for a general detoxification. The blood thus can be purified eliminating infected substances.<sup>3</sup> Grappa makes up the second component. Brandy can also be used.

#### **Ocimum sanctum**

Numerous active components have been isolated from the leaves of *Ocimum sanctum* Linn (OS), a small erect herb from the family Labiatae (Lamiaceae). Commonly referred to as sacred Tulsi, it is a fragrant bushy plant found in semi-tropical and tropical parts of India. Eugenol is identified as the major active constituent by means of liquid chromatography of the essential oil from the leaves.<sup>9</sup> Other components identified include eugenol.

Different parts of the tulsi plant, including the leaves, flowers, stem, root, and seeds, have been used as expectorants, analgesics, anticancer, antiasthmatic, antiemetic, diaphoretic, antidiabetic, antifertility, hepatoprotective, hypotensive, hypolipidmic, and antistress agents by traditional medical practitioners. *Ocimum sanctum* L. has been given many medicinal properties. Additionally, tulsi has been used to treat convulsions, arthritis, pneumonia, fever, and other conditions.<sup>6</sup>

Human fibrosarcoma cells (HFS cells) in culture have been tested against *Ocimum sanctum* L. (Labiatae), a plant with a variety of therapeutic qualities. At g/ml and above, *Ocimum sanctum* ethanolic extract treatment caused cytotoxicity. The cells' cytoplasm was constricted and their nuclei were reduced morphologically.

When the DNA was examined in an agarose gel electrophoresis, it was shown to be fragmented. The extract-treated HFS cells biochemically displayed decreased intracellular glutathione and elevated amounts of lipid peroxidation products. A substantial decrease in tumour volume and an improvement in lifetime were caused by giving mice with Sarcoma-180 solid tumours aqueous and ethanolic extracts of *Ocimum sanctum*.

These findings unequivocally demonstrate the anticancer properties of *Ocimum sanctum* extracts.<sup>16</sup>

It is encouraging that a traditional Indian plant has now produced a number of therapeutically effective preparations and chemicals, which sufficiently encourages scientists to investigate additional details about these medicinal plants. The creation of contemporary drugs from medicinal plants should be emphasised for the control of many diseases, including cancer, since the worldwide scene is currently shifting towards the use of nontoxic plant products with traditional therapeutic uses.

## II. CONCLUSION

Every year, cancer takes the life of millions of people. Various therapies are available for the cancer treatment but they have several limitations such as kidney damage, gastrointestinal disorder, etc., due to which an alternative solution to this problem is required. Plant derived compounds possessing anti-cancerous activities have received huge amount of scientific attention. They play vital role in the cancer prevention and treatment.

Pharmaceutical research has been done in countries like Germany, USA, Japan, France and China to improve the quality of herbal medicine for the cancer treatment. Plants are the major source of secondary metabolites and an important source of pharmaceutical drugs. Herbal drug treatment is an ideal choice as it is comparatively cheaper and may be highly recommended to the poor and rural people for the effective treatment of cancer. Anticancer agents discovered from medicinal plants have played an important role in cancer treatment. It is documented that medicinal herbs have rich anticancer potential due to their immunomodulatory and antioxidant properties, and on the forefront whenever we talk about anticancer remedies, they are a significant source of synthetic and/or herbal origin. Bioactive compounds significantly influenced the cancer research on various aspects. Secondary metabolites from medicinal plants inhibits the DNA damage, arrest the cell cycle, inhibits the tumor cell angiogenesis and induce apoptosis thus prevents the cancer. Researchers must pay attention to the scientific rigor of studies of herbal drugs in the future to improve the status. Only few medicinal plants have been explored for their biological activity from 1000 species, so further investigations of plants in

cancer treatment show a promising activity and it must.

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