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ANTI CANCER PROPERTIES OF PLANTS PRESENT IN WEST GODAVARI DISTRICT OF ANDHRA PRADESH, INDIA- A MINI REVIEW

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ABSTRACT: Cancer is a fatal disease characterized by the abnormal growth of cells. Various factors cause cancer. Synthetic modern medicines have high toxic effects on other systems of the body such as renal system, circulatory system, *etc*. To reduce those toxic effects the scientific world is trying to find inhibitors from the herbal sources. Always the plants proved to be effective and efficient in curing fatal diseases. In this review, an attempt has been made to review the some of the medicinal plants such as *Allium sativum*, *Aloe vera*, *Curcuma longa*, *Picrorhiza kurroa*, *Withania somnifera*, *Ananas cosmosus*, *Annona squamosa, etc*., of about 10 species that have anti-cancerous activity present in West Godavari district of Andhra Pradesh, India.

INTRODUCTION: Cancer is the abnormal growth of cells in our bodies that can lead to death. Cancer cells usually invade and destroy healthy cells [1]. The necessary preventive methods for most of the cancers include dietary changes, stopping the use of tobacco products, treating inflammatory diseases effectively, and taking nutritional supplements that aid immune functions [2]. Several chemopreventive agents are used to treat cancer, but they cause toxicity that prevents their usage [3]. More than 50% of all modern drugs in clinical use are of natural products, many of which can control cancer cells [4]. Medicinal plants are gaining a lot of importance nowadays because of efficacy they have been showing in the traditional healing [5]. Plants used in traditional medicine have stood up to the test of time and contributed many novel compounds for preventive and curative medicine to modern science [6].

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The best source of drugs without dangerous effect to human systems could be the plant source, and this has been proved by the traditional healing system and the recent studies conducted on the experimental animals [7].

Types of Cancers: [8]

1. Cancers of Blood and Lymphatic Systems

- **a.** Hodgkins disease,
- **b.** Leukemias,
- **c.** Lymphomas,
- **d.** Multiple myelomas,
- **e.** Waldenstrom's disease

2. Skin Cancers:

- **a.** Malignant Melanoma

3. Cancers of Digestive Systems:

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

4. Cancers of the 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

Causes of Cancer: [9] Cause of cancer may be various types. They are viral and chemical carcinogens, Tobacco, Ionizing radiations, Heredity, Oncogenes and Tumour suppressor genes, Diet, Immune system, Hormonal imbalance, Occupational exposure, Reproductive factors, Sedentary lifestyle, Alcohol, Drugs, and Pollution.

The Mechanism of Cancer Therapy: [10]

1. Cancer cell proliferation inhibited directly by stimulating macrophage phagocytosis, natural killer cell activity enhances.
2. Promoting apoptosis of cancer cells by increasing production of interferon-I, interleukin-2, immunoglobulin and complement in blood serum.
3. Enforcing the necrosis of the tumor and inhibiting its translocation and spread by blocking the blood source of tumor tissue.
4. Stimulating the hemopoietic function to enhance the number of leukocytes and platelets.
5. Promoting the reverse transformation from tumor cells into normal cells.
6. Promoting metabolism and preventing carcinogenesis of normal cells.
7. Stimulating appetite, improving quality of sleep, relieving pain, thus benefiting patients health.

***Allium sativum* (Amaryllidaceae):** Rajeev Nema *et al.*, (2014) used *Allium Sativum* (Bulb) Polyphenolic Compound activity on MCF-7, A549 and PA-1 cancer cell lines (breast, lung, and ovary cancer respectively). Hydroalcoholic (1:1) extract of *Allium Sativum* (Bulb) was prepared and tested for their cytotoxic activities against cancer cell lines (MCF-7, A-549, and PA-1) with standard Doxorubicin. The hydroalcoholic extract showed potent anti-cancer activity on breast, lung, and ovary cancer cell lines [11].

***Aloe vera* (Liliaceae):** Antitumor activity of 50% ethanol extract (100 mg/kg) of *Aloe vera* was evaluated against Ehrlich ascites carcinoma (EAC) tumor in mice. The extract was administered daily for 14 days. Hematological profile reverted towards normal levels, *Aloe vera* extract restored the serum biochemical parameters towards normal levels and decreased the levels of lipid peroxidation and increased the levels of reduced glutathione and other antioxidant enzymes (SOD, CAT, and GPx). The 50% ethanol extract of *Aloe vera* exhibited an antitumor effect by modulating lipid peroxidation and augmenting antioxidant defense system in EAC bearing mice [12].

***Curcuma longa* (Zingiberaceae):** Hashim *et al.*, (2013) evaluated Ethanolic turmeric extracts (ETE) as an anticancer agent by detecting the apoptotic induction and DNA damage activity of ETE which were investigated against two human leukemic cell lines, U937 (human monocytic leukemia cell line) and Molt4 (human lymphoblastic cell line). Ethanolic turmeric extracts (ETE) showed that have apoptogenic and DNA damage activity against two human leukemic cell lines [13].

***Picrorhiza kurroa* (Plantaginaceae):** Hemanth Kumar, Ramesh (2014) evaluated the anticancer and cytotoxic potential of Nano encapsulated extract formulation from the rhizome of *Picrorhiza kurroa* enriched with Apocynin, caffeic esters, and cucurbitacins aglycone compounds, to produce any cytotoxic effect on mammalian cell lines. The test conducted using the MTT method using human hepatocarcinoma cells (HepG2) and Madin Darby Canine Kidney (MDCK) cell lines. Cytotoxic effect against HePG-2 cancer cell line is considered as a predictive anticancer activity. MDCK cytotoxicity results support that formulation is less cytotoxic in

normal cell lines, as MDCK is a Non-Cancerous cell line [14].

***Withania somnifera* (Solanaceae):** Rajeev Nema *et al.*, (2013) determined the use of *Withania Somnifera* (leaves) Polyphenolic Compound activity on MCF-7, A549 and PA-1 cancer cell line (breast, lung, and ovary respectively). Hydroalcoholic (1:1) sample of *Withania Somnifera* (leaves) was prepared and tested for their cytotoxic activities against cancer cell lines (MCF7, A549 and PA1) with standard Doxorubicin. The hydroalcoholic extract showed efficient anti-cancer activity on breast, lung and ovary cancer cell lines [15].

***Zingiber officinale* (Zingiberaceae):** Ginger leaf (GL) has long been used as a vegetable, tea, and herbal medicine. Park GH *et al.*, (2014) evaluated the anti-cancer properties of ginger leaf and then elucidated the potential mechanisms involved. Exposure of GL to human colorectal cancer cells (HCT116, SW480, and LoVo cells) reduced the cell viability and induced apoptosis in a dose-dependent manner. Also, GL reduced cell viability in MCF-7, MDA-MB-231 and HepG-2 cells [16].

***Ananas cosmosus* (Bromeliaceae):** Stem bromelain (EC 3.4.22.32) is a significant cysteine proteinase, isolated from pineapple (*Ananas comosus*) stem. To verify the identity of the principle in stem fractions responsible for the antitumoral effect, bromelain was isolated to probe its pharmacological effects. The isolated bromelain was obtained from stems of adult pineapple plants by buffered aqueous extraction and cationic chromatography. The *in-vivo* antitumoral/ antileukemic activity was evaluated using the following panel of tumor lines: P-388 leukemia, sarcoma (S-37), Ehrlich ascitic tumor (EAT), Lewis lung carcinoma (LLC), MB-F10 melanoma and ADC-755 mammary adenocarcinoma. Bromelain has shown efficient anti-cancerous effects on above all cell lines [17].

***Annona squamosa* (Annonaceae):** Seeds of *Annona squamosa* L. have been used in the south of China as a folk remedy to treat "malignant sores" (cancer). To investigate the chemical constituents and the anti-tumor activity of the standardized *A. squamosa* seeds extract *in-vitro* and *in-vivo*. Annonaceous acetogenin profiles of the standardized extract were determined by using Fourier transform infrared (FT-IR) and high-performance liquid chromatography (HPLC) techniques. Two major annonaceous acetogenins: 12, 15-cis-squamostatin-A and bullatacin were identified and quantified by HPLC.

The seed extract showed significant anti-tumor activity against four human tumor cell lines, especially for MCF-7 (IC_{50} 0.25 µg/ml) and Hep G2 (IC(50). 0.36 µg/ml) cells in vitro. The extract Inhibited the growth of H(22) tumor cells in mice with a maximum inhibitory rate of 69.55% by oral administration. A. squamosa seed extract showed significant anti-tumor activities against human hepatoma cells *in-vitro* and *in-vivo*, indicating a potential for developing the extract as a novel anti-liver cancer drug [18].

***Mentha citrata* and *Mentha longifolia* (Lamiaceae):** Sahar Y Al-Okbi *et al.*, (2015) studied the anti-cancer and antioxidant activity of two nutraceuticals (mixtures of different extracts) prepared from *Mentha citrata* and Mentha longifolia aerial parts separately. The anti-cancer activity was evaluated in three cancer cell lines. Results showed inhibition of the three tested cancer cells (liver, cervix and colon carcinoma) by the tested nutraceuticals with variable degrees. *Mentha citrata* and *Mentha longifolia* possess antioxidant and anticancer effect that could be attributed to the presence of phytosterols, phenolic compounds, unsaturated fatty acids, and specific volatile constituents [19].

TABLE 1: SHOWS ANTI CANCER COMPOUNDS FROM PLANTS

S. no.	Anticancer compound	Reference
1	Withanolides, steroidal lactones found in Solanaceae plants, exhibits potential anticancer activities	20
2	Ursolic acid, induced apoptosis in K562 cells involving upregulation of PTEN gene expression and inactivation of the PI3K/Akt pathway	21
3	Carnosic acid inhibited the proliferation and migration capacity of human colorectal cancer cells	22
4	Magnolol, a natural compound, induced apoptosis of SGC-7901 human gastric adenocarcinoma cells *via* the mitochondrial and PI3K/Akt signaling pathways	23

5	Sanguinarine, induced apoptosis of HT-29 human colon cancer cells *via* the regulation of Bax/Bcl-2 ratio and caspase-9-dependent pathway	24
6	Plumbagin, induced apoptosis in Her2-overexpressing breast cancer cells through the mitochondrial-mediated pathway	25
7	4-Shogaol, an active constituent of dietary ginger, inhibited metastasis of MDA-MB-231 human breast adenocarcinoma cells by decreasing the repression of NF-κB/Snail on RKIP	26
8	Betulinic acid, induced apoptosis in many cancerous cell lines	27
9	Pomolic acid, induced AMP-activated protein kinase activation in MCF7 human breast cancer cells	28
10	Sulforaphane, a cruciferous vegetable-derived isothiocyanate, inhibit sprote in synthesis in human prostate cancer cells	29

CONCLUSION: As the severity of cancer is very high it is the responsibility of the scientific community to find inhibitors from the natural plant sources because of a lack of anarchic side effects and efficacy. Plants proved to be effective in curing a lot of deadly diseases. The plants mentioned above have anti-cancerous activity so that this review will be useful for further studies to find effective drugs from natural plant sources. Still, there are a lot of plants to be explored for anti-cancerous activity.

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