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RESEARCH ARTICLE

A REVIEW ON TRADITIONAL MEDICINAL PLANTS FOR ANTICANCEROUS ACTIVITY

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INTRODUCTION

According to World Health Organization, 80% of the people living in rural areas depend on medicinal herbs as primary health care system. Herbal medicines have a vital role in the prevention and treatment of cancer and medicinal herbs are commonly available and comparatively economical. A great deal of pharmaceutical research done in technologically advanced countries like USA, Germany, France, Japan and China has considerably improved quality of the herbal medicines used in the treatment of cancer. Medicinal herbs are also significant source of synthetic and herbal drugs. So far, pharmaceutical companies have screened more than 25,000 plants for anti-cancer drugs.

Just as cancers are a product of disturbances in the body, so herbs can correct the disturbances as well as control many cancers. Herbal system of medicine has been practiced for thousands of years. Phytoconstituents derived from the herbs *Vinca rosea*, *Allium sativum*, *Aloe vera*, *Angelica sinensis*, *Glycine max*, *Glycyrrhiza glabra*, *Hordeum vulgare*, *Hydrocotyle asiatica*, *Medicago sativa*, *Morinda citrifolia*, *Panax pseudoginseng*, *Saussurea lappa*, *Taxus wallichiana*, *Tinospora cordifolia*, *Viscum album*, *Withania somnifera*, *Zingiber officinale* etc. have been used in various formulations to enhance activity of immune cells of the body that promotes production of cytokines including interleukin, interferon, tumor

ABSTRACT

Medicinal plant is the most exclusive source of life saving drugs for majority of the world's population that are commonly available and comparatively economical. Scientists all over the world are concentrating on herbal medicines to boost the immune cells of the body against cancer. With advanced knowledge of molecular science and refinement in isolation and structure, various anticancerous herbs has been identified, which executes their therapeutic effect by inhibiting cancer activating enzymes, hormones, stimulating DNA repair mechanism and enhancing immunity of the body. By understanding the complex synergistic interaction of various constituents of anticancerous medicinal plants, the herbal formulations can be designed to attack the cancerous cells without harming normal cells of the body. Hence the present study is focused on the plants used previously and recently identified for the treatment of cancer and also to reduce the toxic effects of chemotherapy and radiotherapy, particularly to reduce the pain during the treatment.

necrosis factor and colony stimulating factor. These formulations help the body to fight cancer more effectively and reduce toxic side effects of chemotherapy and radiotherapy stages of cancer. Thus from the earliest times, herbs have been prized for their pain-relieving and healing abilities and today we still rely largely on the curative properties of plants.

What is cancer?

Cancer is a general term applied to the series of malignant diseases that may affect different parts of the body. These diseases are characterized by a rapid and uncontrolled formation of abnormal cells, which may mass together to form a growth or tumor or proliferate throughout the body, initiating abnormal growth at other sites. The main forms of treatment for cancer in humans are surgery, radiation and drugs. In recent years, a lot of efforts have been applied to the synthesis of potential anticancer drugs. A successful anticancer drug should kill or incapacitate cancer cells without causing excessive damage to normal cells. There is a continued need for new prototype-new templates to use in the design of potential chemotherapeutic agents in which natural products are providing such templates.

Causes Of Cancer

Modern medicine attributes most cases of cancer to changes in DNA that reduce or eliminate the normal controls over cellular

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growth, maturation and programmed cell death. These changes are more likely to occur in people with certain genetic backgrounds and in persons infected by chronic viruses (e.g., viral hepatitis may lead to liver cancer; HIV may lead to lymphoma). The ultimate cause, regardless of genetic propensity or viruses that may influence the risk of the cancer, is often exposure to carcinogenic chemicals (including those found in nature) and/or to radiation (including natural cosmic and earthly radiation), coupled with a failure of the immune system to eliminate the cancer cells at an early stage in their multiplication. The immunological weakness might arise years after the exposure to chemicals or radiation. Other factors such as tobacco smoking, alcohol consumption, excess use of caffeine and other drugs, sunshine, infections from such oncogenic virus like cervical papilloma viruses, adenoviruses, kaposi sarcoma (HSV) or exposure to asbestos. These obviously are implicated as causal agents of mammalian cancers. However a large population of people is often exposed to these agents. A Cancer cell also has the character of immortality even in vitro whereas normal cells stop dividing after 50-70 generations and undergoes a programmed cell death (Apoptosis). Cancer cells continue to grow invading nearby tissues and metastasizing to distant parts of the body. Metastasis is the most lethal aspect of carcinogenesis.

Herbs With Anticancer Activity

The list of plants along with their chemical constituents responsible for anticancer activity is given in table no. 1

Aloe vera

Aloe vera contains aloe-emodin, which activates the macrophages to fight cancer. A compound in *Aloe vera* leaves slow down the spread of breast cancer cells. *Aloe vera* also contains acemannan, which enhances activity of the immune cells against cancer and the plant has been found to inhibit metastases. Stepping up in the battle against cancer, according to a new study, aloe-emodin, Researchers are currently investigating how *Aloe* may play a role in other types of cancer. (Pecere, 2000). (Plate -1)

Catharanthus roseus

Vinca rosea contains vinca alkaloids, which were the first phytoconstituents ever used to treat cancer. Intense work on *Catharanthus roseus*, a folklore hypoglycaemic drug, led to isolation of more than 70 dimeric indole alkaloids, which include vinblastine, vincristine (leurocristine), alstonine, ajmalicine and reserpine. Vinca alkaloids execute the anticancer effect by binding to the tubulin (microtubule protein) thereby breaking down the microtubules, thus inhibiting formation of mitotic spindle in the metaphase that arrests division of the cancerous cells. Although structurally closely related, vinblastine and vincristine have significant difference in their clinical utility. Vinblastine is used in the treatment of Hodgkin's disease, non-Hodgkin's lymphoma and cancers of the kidney and the testis. Vincristine is usually given in combination with other anticancer agents to treat acute lymphocytic leukaemia, Wilm's tumour, neuroblastoma, rhabdomyosarcoma, Ewing's sarcoma, lymphoma and cancers

of the breast, lung, bladder and the cervix. (Jean Bruneton, 1993). (Plate-2)

Curcuma longa

Curcuma longa contains curcumin, which inhibits the growth of cancer by preventing production of harmful eicosanoid such as PGE-2. The anticancer effect of curcumin has been demonstrated in all the steps of cancer development, i.e. initiation, promotion and progression of cancer. Data obtained from several studies suggest that curcumin inhibits the genesis of cancer as well as promotes the regression of cancer. Curcumin suppresses mutagenic effect of various mutagens including cigarette smoke condensates, 7,12-Di Methylbenz anthracene (DMBA) and benzopyrene. Curcumin is found to decrease levels of urinary mutagens. It also possesses anti-inflammatory and antioxidant properties. The protective effects of *Curcuma longa* and its derivatives are partially due to direct antioxidant effect. Studies have revealed that *Curcuma longa* inhibits production of nitrosamine that enhances natural antioxidant functions of the body. *Curcuma longa* increases levels of glutathione and other non-protein sulphahydryls. It acts directly on several enzymes. Curcumin is used to treat squamous cell carcinoma of the skin and the ulcerating oral cancer. *Curcuma longa* also prevents malignant transformation of leukoplakia. Its active phenolic constituents inhibit cancer and also have antimutagenic activity. Turmeric has been shown to suppress the development of stomach, breast, lung and skin tumors. Its activity is largely due to the antioxidant curcumin, which has been shown to be an effective anti-inflammatory agent in humans. (Chan and Fong,1994). (Plate-3)

Withania somnifera

Withania somnifera contains withanolides, which possess immuno-modulatory activity. Withaferin A and withanolide D found in *Withania somnifera* are known to inhibit growth of cancer. The other alkaloids presents in *Withania somnifera* are ashwagandhine, cuscohygrine, anahygrine, tropine, steroidallactones, withasomniferin-A, withasomidienone, withasomniferols A-C, and withanone. Other constituents include saponins containing an additional acyl group (sitoindoside VII and VIII), and withanolides with a glucose at carbon (Kikuzaki and Nakatani,1993). Apart from these contents plant also contain chemical constituents like withaniol, acylsteryl glucosides, starch, reducing sugar, hantreacotane and ducitol, Studies have revealed that *Withania somnifera* enhances the therapeutic effect of radiotherapy. The chemopreventive activity is thought to be due in part to the antioxidant / free radical scavenging activity of the extract⁶⁵. An *in vitro* study showed withanolides from *Withania somnifera* inhibited growth in human breast, central nervous system, lung, and colon cancer cell lines comparable to doxorubicin. (Devi, 1996). (Plate- 4)

Zingiber officinalis

Zingiber officinalis (ginger) rhizomes offer a rich package of gingerols-phenolic antioxidants that possess pronounced anti-inflammatory activity-that inhibit various cancers. Ginger also contains curcumin, which assists in the elimination of cancer

causing substances from the body. The anticancer properties of ginger are attributed to the presence of certain pungent vallinoids, viz. [6]-gingerol and [6]-paradol, as well as some other constituents like shogaols, zingerone etc. A number of mechanisms that may be involved in the chemopreventive effects of ginger and its components have been reported from the laboratory studies in a wide range of experimental models. (Katiyar, *et al.*,1996). (Plate-5)



Plate -1 *Aloe vera*



Plate-2 *Catharanthus roseus*



Plate-3 *Curcuma longa*



Plate -4 *Withania somnifera*



Plate -5 *Zingiber officinalis*

DISCUSSION

Science has long acknowledged the value of healing with the substances that are found in nature such as digitalis, aspirin, penicillin, insulin, steroids, etc. There has been a resurgence of interest, both scientifically and popularly in the utilization of natural approaches. Experiments on cell lines and in animals demonstrated that herbal drugs play an anticancer role by inducing apoptosis and differentiation, enhancing the immune system, inhibiting angiogenesis and reversing multidrug resistance. Many clinical trials focusing on the anticancer effects of herbal formulas have been conducted. Though many of them demonstrated that herbs are especially useful in improving survival and quality of life in patients suffering from advanced cancer. From this study, it is clear that the medicinal plants play a vital role against various diseases. Various herbal plants and plants extracts have significant Antiulcer, Antipyretic, Anti-diabetic and Anti-cancerous activity in different animal models. Our review result shows that above-mentioned medicinal plants could prevent from Fever, Ulcer, Diabetes and Cancer with the principle on dose-dependent. A variety of botanical products have been reported to possess anticancerous activity. Hence from the review reveals that the herbal drug possesses anti-cancerous activity and it has been proved by different animal models which give many links to develop the future trials.

Table 1 Plants with Anti-Cancerous activity.

Sl.no	Botanical name	Family	Common name	Active constituent
1.	<i>Aloe barbadensis</i> , Linn	<i>Liliaceae</i>	Aloe vera	Aloe-emodin, emodin, aloin
2.	<i>Catharanthus roseus</i> ,(L)	<i>Apocynaceae</i>	Vinca	Vinca Vinblastine, Vincristine, Alstonine, Ajmalicine and Reserpine.
3.	<i>Curcuma longa</i> ,Linn	<i>Zinziberaceae</i>	Turmeric	Tumerone, Curcumine
4.	<i>Withania somnifera</i> ,(L)	<i>Solanaceae</i>	Ashwagandha	Withanolides, <i>Withafer</i>
5.	<i>Zingiber officinale</i> , Linn	<i>Zingiberaceae</i>	Ginger	Curcumin, gingerenone A, Gingeols, shogaols, zingerone

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