Review Article

ROLE OF HERBS IN PREVENTING CANCER

Chaudhary Gulshan¹ and Dewakar Kumar Manoj²

¹Division of Genetics, Indian Agriculture Research Institute, Pusa campus, New Delhi, India

²Centre for Culture, Media and Governance, Mujeeb Bagh, Jamia Nagar, Jamila Mellia Islamia, New Delhi, India

*Corresponding Author Email: chaudhary84@gmail.com

Article Received on: 02/03/14 Revised on: 21/03/14 Approved for publication: 15/04/14

DOI: 10.7897/2230-8407.050456

ABSTRACT

Worldwide research is being done to seek out effective treatments for cancer by the compounds present naturally in plants. These secondary compounds help to inhibit or to kill the carcinogenic cells and helps to relieve cancer patients. Plant based therapy are preferred due to its low cost, availability and generic information. Herbal drugs are considered a natural alternative because some plants compounds have the ability to prevent the spread or risk of developing various forms of cancer. Secondly, the plant based drugs plays an important role in the development of several clinically useful anti cancerous drug. This review is focused towards the important role of some herbal plants and its secondary compounds in curing cancer.

Keywords: Cancer, Camptothecin, Topotecan, Paclitaxel, Vinblastine, Podophyllotoxin, Teniposide, Homoharringtonine, Acetogenins, Artesunate

INTRODUCTION

Medicinal plants play a significant role as therapeutics aids in health system in all over the world. Therefore from ancient period to modern era herbal drugs have been used to cure several diseases. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body. These medicinal plants constitute an important group of non-wood forest products and represent a vast potential source for anticancer compounds^{25,28}. Approximately 80 % of the world population uses plants as a source of medicine for healthcare. India has been one of the pioneers in the development and practice of well-documented indigenous systems of medicine, particularly in Ayurveda, Siddha and Unani system, all these systems of medicine are gaining world-wide popularity. According to WHO essential medicine list contains 252 drugs out of which 11 % is exclusively of plant origin^{6,26}. Consequently, there has been great demand for these plants but regrettably only a few medicinal plants are being cultivated on a commercial scale with a majority still being collected from the wild. Due of over exploitation of plants from the wild the habitat destruction several medicinal plants have become endangered. For survival there is a need to conserve the wild populations of plant in the natural or in wild conditions to meet the commercial needs through cultivation^{1,18}. In the present scenario herbal medicines are in evolutionary process for developing new medicines therefore pharmaceutical companies are involved in research on plant materials for their potential medicinal value as the demand for herbal products is growing exponentially due to its fewer side effects as compare to other system of medicines^{17,21}. According to World Health Organization^{36,37} cancer is the second most frequent cause of death in developed countries. Many cancer patients use complementary and alternative medicine treatments^{24,31}. A wide range of knowledge regarding pharmacological research has considerably improved the quality of herbal drugs in cancer treatment. Among several treatments homeopathy is one of the most popular complementary and alternative medicine modalities for cancer patients but due to the lack of knowledge about its

utilization, is a major factor for threatening the large scale cultivation of plant^{6,22,23,30}. In this review we tried to summarize some medicinal plant species information which may be used to open a new era for development of new drug for various ailments. Some important well known phytochemical used for the treatment of cancer are listed below (Figure A-L). Some important plants and its drugs to cure cancer are listed below as:

Camptotheca acuminata (Corneaceae)

It is 20 m tall deciduous trees commonly known as Happy Tree or Cancer Tree. Camptothecin (Figure A) a natural alkaloid extracted from the bark of the tree. While Topotecan (Figure B) a derivative of Camptothecin and a type of chemotherapeutic drug. Topotecan is the first topoisomerase I inhibitor for Ovarian cancer⁹, Cervical cancer¹⁰, Small cell lung cancer¹¹.

Catharanthus roseus (Apocynaceae)

It is 1 m tall evergreen shrub commonly known as Vincarosea. Vinblastine (Figure D) is a vinka alkaloid and a chemical analog of vincristine and generated in plant by joining of two alkaloids catharanthin and vindoline. It is an anti microtubule drug used to treat certain kinds of cancer, including Hodgkin's lymphoma, non-small cell lung cancer, breast cancer, head and neck cancer and testicular cancer. It is also used to treat Langerhans cell histiocytosis^{15,35}.

Podophyllum hexandrum (Berberdaceae)

It is 11-12 inches high from field commonly known as Himalaya mayapple. Podophyllotoxin (Figure E) is a non-alkaloid toxin lignan extracted from the roots and rhizomes of *Podophyllum* species. Podophyllotoxin and its derivatives display a wide selection in medical applications such as purgative, vesicant, anti rheumatic, antiviral, and antitumor agents. These derivatives include etoposide, teniposide (Figure F) and etopophos. Their anticancer activity are under study and used in various chemotherapies, including lung cancer, lymphomas, and genital tumors^{3,26}.

***Annonama crocarpa* (Annonaceae)**

It is small evergreen tree commonly known as Graviola. Graviola produces a natural compound acetogenins (Figure H) used as anti cancerous agent. According to the Purdue University, 1997 acetogenins is effective in killing tumors and also resistant to anti-cancer agents and later in 2003 Taiwan researchers also stated that annonacin is a promising anti-cancer agent in low dosages^{16,34}.

***Artemisia annua* (Asteraceae)**

It is also known as sweet wormwood, sweet fern, sweet sage wort sprang. In more recent research artemisin (Figure I) and its derivatives also helps to induce apoptosis of prostate cancer cells and it also activity against breast cancer cells, leukaemia, colon and other cancer cells¹⁹. Artemisinins such as artesunate found to be active against a variety of unrelated tumor cells lines from the most common types such as colon, breast and lung cancers to leukaemias and pancreatic cancer^{4,7,14}.

***Glycyrrhiza glabra* (Fabaceae)**

It is 1 m tall commonly known as liquorice. Roots are used for gastrointestinal health and also rich in flavonoids and an antioxidant which acts as a cancer protecting, botanical boosting and an anti-mutagen, which preventing damage to genetic material Glycyrrhizin (Figure J) a triterpenoid saponin isolated from licorice root induce apoptosis in many cell types including human hepatoma, promyelotic leukemia and stomach cancer^{29,30,32,33}.

***Corcus sativa* (Iridiaceae)**

It is 20-30 cm tall commonly known as saffron crocus. Stigmas of the flower contain crocin, anthocyanin, carotene and lycopene and these constituents have various pharmacological effects on different illness. Among all the constituents crocin (Figure K) have anti-cancer activity and basically used for colorectal cancer treatment^{2,12}.

***Taxus baccata* (Taxaceae)**

It is a small 10-20 m evergreen tree. Taxol or Paclitaxel (Figure L) an important anticancer drug inhibits cell replication by binding to and stabilizing microtubule polymers²⁰.

***Viscum album* (Santalaceae)**

Parasitic plant grows on other trees commonly known as European mistletoe used in cancer treatment for about last several years. Its extracts contain a variety of biologically active compounds. The most thoroughly investigated compounds are the mistletoe lectins and are widely in gynaecological and breast-cancer treatment^{8,12,13}.

***Wedelia calendula* L (Asteraceae)**

Vitaceae leaf and root used in stomach and lung cancer⁵ while flower part used for treating cancer as it contains various anti cancerous compounds^{17,27}.

Figure A. Camptothecin B. Topotecan C. Paclitaxel D. Vinblastine E. Podophyllotoxin F. Teniposide G. Homoharringtonine H. Acetogenins I. Artesunate J. Glycyrrhizin K. Crocin L. Taxol

CONCLUSION

Herbal drugs are well known to have good immunomodulatory properties. They promote host resistance against infection by stimulating both nonspecific and specific immunity. The medicinal plants contain many antioxidants, carotenoids, flavonoids, poly phenols, saponins, enzymes and minerals. Several reports state that antioxidants possess remarkable anti tumor or anticancer activity. Conclusively, all plants mentioned in this review exhibit anti tumor activity with some other biological activities. It was well known that phytomedicines or medicinal plants have versatile remedial properties against tumor so that it requires a detailed research for more beneficial effects. The isolation and identification of various combinations of these secondary compounds can be made and they can be further assessed for synergistic effects and the preparation of the standardized dosage regimen can play a critical role in the therapy of tumors prevention. Therefore, it is necessary for searching and manufacturing newer herbal drugs from the ethno-medicinal plants possess a remarkable antitumor activity.

ACKNOWLEDGEMENT

The authors are thankful to the all the lab members of Genetics division, Indian Agriculture Research Institute, Pusa campus, New Delhi and Centre for Culture, Media and Governance, Mujeeb Bagh, Jamia Nagar, Jamia Mellia Islamia, New Delhi, India.

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Cite this article as:

Chaudhary Gulshan and Dewakar Kumar Manoj. Role of herbs in preventing cancer. *Int. Res. J. Pharm.* 2014; 5(4):264-266 <http://dx.doi.org/10.7897/2230-8407.050456>