

# Ethnobotany and literature survey of anti-cancer herbal drugs in Vidarbha region

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Review Article

## Abstract

In India, we have several system of medicine, viz. Nature care, Homeopathy, Siddha, Unani & the ancient Indian health care system, Ayurveda. Several Ayurvedic preparations employ a combination of several species of plants for prevention or cure of diseases.

Being a dreadful human disease, cancer kills annually about 3500 per millions population around the world. A large number of chemo preventive agents are used to cure cancers but they produce toxic side effect that prevent their excessive usage. Although more than 1500 anticancer drugs are in active development with over 500 of the drugs under clinical trials, there is an urgent need to develop much effective and less toxic therapies. In India, there are only limited research studies on curing cancers using herbal extracts which are largely confined to tomato, garlic & neem.

Many of the plants, till date, have not been tested scientifically to validate their tradition medicinal uses. A broad based screening of a large number of organisms is necessary in order to identify anticancer compound. This is because of the fact that only less than 2% of the organisms screened so far have shown anticancer activity. In the present paper, the herbal medicines for cancer cure are discussed. Considering the medicinal importance of some plants, ethno-medicinal survey of anticancer plants was carrying out in Vidarbha region.

**Keywords :** Ethno-botany, anticancer drugs, Ayurveda

## Introduction

Plants have been used in the traditional healthcare system from time immemorial, particularly among the tribal communities. The World Health Organization (WHO) has listed 20,000 medicinal plants globally. India's contribution is 15-20% i.e. 3000-4000 medicinal plants. According to WHO estimate, about 80% of the population in the developing countries depends directly or indirectly on plants for its medicines. In India, about 2000 drugs used are of plant origin.

For several thousand years, man has used herbs as medicines but it is only since the mid nineteenth century that serious efforts were made to isolate and purify the active principles of these remedies. Since then, a large variety of biologically active compounds have been obtained and their structure determined eg. Morphine from Opium, Cocaine from Coca leaves and Quinine from bark of Cinchona tree etc. (Patrick, 1995).

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India has been traditionally a leading exporter of primary agricultural products such as tea, coffee, rubber, cardamom, cotton, several spices, flavoring, aromatic and medicinal crops. This status is declining due to low productivity, non-competitive prices and sometimes poor quality of material. Therefore, our urgent need to improve plant cultivars for quality and quantity is required using biotechnological methods (Ramawat, 2000).

Cancer should be called a symptom rather than disease. It indicates the abnormal uncontrolled and rapid growth of cells. Because of this, cancer cells are malignant in nature. Cancer cells differ from normal biological cells mainly in two ways. Firstly, so long as the host alive, cancer cells are also alive and rapidly multiply themselves to form new cancer cells. They do not die until they die. But in case of ordinary cells, they after a cycle decay automatically. Secondly, cancer cell can undergo 'metastasis'. The term metastasis means transfer of cancer cells from one organ of the body to another not directly connected with it. All malignant cells are capable of metastasizing, which means forming new loci in a distant part of the body from the original position. Ordinary cells on the other hand have no such power of metastasis. No stomach cell can move to the heart or heart cells to brain and so on.

The use of plants for treating various diseases predates human history and forms the origin of much of the modern medicines; herbs were the mainstream remedies for nearly all ailments. People commonly diagnosed their own illness, prepared and prescribed their own herbal medicines or brought them from the local apothecaries (Tyler, 2000). Herbal medicines are being used increasingly as dietary supplements to fight or prevent common maladies like cancer, heart attacks and depression. When added to food as supplements, herbs have also been termed as nutraceuticals. According to WHO, herbal medicine is defined as plant derived material or preparation, which contains raw or processed ingredients from one or more plants, with therapeutic values (Parle and Bansal, 2006).

Development of an anticancer drug is always a fascinating challenge for the scientists working in the field of cancer research. Attempt at chemical treatment of malignant tumor were recorded as long as the first century A.D. It is interesting that Colchicine, obtained from autumn crocus i.e. *Colchicum autumnale*, was first used as an anticancerous agent. Although there are reports to use different metals in the treatment of cancer

and later on systematic research was started by Paul Enrich in early twentieth century (Sanyal, 2004).

In the recent years, greater emphases of the plant scientists have been towards the search for plants with anti tumour and anti cancerous activities. Nature keeps in its vast green treasure, the secretes of healthy life of the man. Undoubtedly, nature has all along with the diseases has created their cure and for every disease that arise on this planet plants has a cure. Er. J. Hartewell (1967-71) of National Cancer Institute, Bethesda, U.S., has assembled data on 3000 plants which possess anticancerous properties. Many of these plants were used by the primitive folk healers against various diseases. *Catharanthus roseus* which provided to the world the world the most potent weapon for the treatment of childhood leukemia was a folklore plant and was used for the treatment of diabetes by primitive healers (Sinha, 1996). The role of cancer medicines is undoubtedly remarkable owing to the increasing scope and complexity of cytotoxic drugs. In this connection, a large number of plants have been tried and a quite good number of them have been used with success. (Syed, 2001).

Plant natural products have had, and continue to have, an important role as medicinal and pharmaceutical agents, not only as purified isolates and extractives, but also as lead compounds for synthetic optimization. For eg. if cancer chemotherapeutic agents are considered, there are now four structural classes of plant derived anticancer agents on the market in US, represented by *Catharanthus* alkaloids (Vinblastine, Vincristine and Vindoline), the epi-podophyllotoxin (Etoposide and Teniposide), the taxens (Paclitaxel and Docetaxel), and the Camptothecin derivatives (Camptotecin and Irinotecan). Plants secondary metabolites also show promise for cancer chemo preservation, which has been defined as, the use of non -cytotoxic nutrients or pharmacological agents to enhance intrinsic physiological mechanisms that protects the organs is against mutant clones of malignant cells. There has been considerable prior work on the cancer chemo preventive efforts of constituents of certain culinary herbs, fruits, spices, teas and vegetables, in which their ability to prevent the development of cancer in laboratory animals has been demonstrated (Huang et.al., 1994, Ho, et.al., 1994).

Out of 2,50,000-3,00,000 total plant species of the world, India harbour about 45,000 means 18% plants, out of these 20,000 medicinal plants of the world, India contributes about 15 percent i.e. about 3000-3500 medicinal plants. About 90 percent of these are found growing wild in different climatic regions of the country. Out of 3000 medicinal plants occurring in India, about 200 species are used in bulk quantities as articles of commerce. (Ahmed, 1993). various workers worked in ethno-botanical evidences and ayurvedic formulations

such as, Nadkarni (1908), Kirtikar and Basu (1918), Chopra et.al. (1956), Majumdar (1989), Shivrajan and Bhalchandran (1994), Stehle et.al. (1997), Samantha et.al. (2001, 2002).

So far, the only higher plant which is used as a source of patented anticancerous drug is *Catharanthus roseus*. The anticancer activity of the alkaloids of this plant was a chance discovery by Nobel et.al. (1958) during their investigations aimed at verifying the commonly believed diabetes curing properties attributed to *C-roseus* in Jamaica. The two oncolytic alkaloids isolated from leaves are Vinblastine sulphate (marketed as VENBAN) which is used for treatment of Hodgkin's disease and other lymphomas solid tumours and Vincristine sulphate (marketed as ONCOVIN) which is used in the treatment of acute lymphocytic leukaemia which arrest the mitosis in metaphase and other tumours of childhood.

India has been the major exporter of the drug and the requirement are being met from large scale cultivation of this crop in South India. *Catharanthus roseus* being a hardy crop posed fewer problems in its cultivation. *Catharanthus roseus* has lent itself as a choice candidate for commercial cultivation as it requires only small quantities of root samples that could be easily made available by breeders (Rangari et.al. 2008)

The use of plant drugs in cancer treatment is traced back to over 350 years. However a consolidated and systematic study in this field is of relatively recent origin. Some of the anticancerous drugs from plant sources which are commercially extracted are; Diosgenin-from *Dioscorea bulbifera*; Tropane-from *Datura metel*; Taxol- from *Taxus brevifolia*; Glycyrrhetic acid from *Glycyrrhiza glabra*; Ajmalicine-from *Vinca*; Podophyllotoxin -from *Podophyllum peltatum* (Sinha and Jain, 1994).

From a particular medicinal plant the formation of drug had a multistep process like,

Medicinal plant → Taxonomist → Chemist → Technician → Pharmacologist → Drug.

#### Drug discovery

Institutions like Indian Council for Agricultural Research, Delhi (ICAR); Indian council for medical Research (ICMR); Central Drug Research Institute, Lucknow (CDRI); Central Institute of Medicinal and Aromatic Plants, Lucknow (CIMAP); Regional Research Laboratory, Jammu (RRL). TANU Coimbatore is actively concerned with the cultivation and processing of many medicinal and aromatic plants. The research and development data available from these organizations could be utilized for planning the cultivation of such medicinal plants (Pushpangadan, 1992).

Ethnobotany serves to collect the information about the various medicinal uses of the plants, which are used by tribal people. The objective of the present survey was to

collect information of native plant for their medicinal use, establish their therapeutic potential, thereby developing trust and faith among the people for their safe and effective use. Thus by exploring the hidden green wealth,

India can boost their economy by substantially increasing their exports of herbal medicines at the trade front and can corner the larger slice from the herbal world market share.

**Table no. 1:**  
**Enumeration of anti cancer plants which are commonly found in Vidarbha region**

SR. No.	Botanical name	Common name	Parts used
1	<i>Acacia nilotica</i> L. Syn. <i>A-arabica</i> Willd.	Babul	Leaves
2	<i>Aloe barbadensis</i> Mill.	Gawar patha	Entire plant
3	<i>Allium sativum</i> L.	Lehsun	Clove
4	<i>Allamanda cathartica</i> L. Var. <i>A- grandiflora</i>	Golden trumpet	Latex
5	<i>Bauhinia variegata</i> L.	Kachnar	Bark
6	<i>Beta vulgaris</i> L.	Chukander	Leaves
7	<i>Brassica juncea</i> L. Czern and Coss.	Mustard	Seeds
8	<i>Brassica oleracea</i> L. Var. <i>capitata</i> L.	gobhi	Roots, leaves, Inflorescence, seeds.
9	<i>Calotropis procera</i> L.	Akra	Plant extract
10	<i>Cannabis sativa</i> L.	Bhang	Plant ash
11	<i>Capparis spinosa</i> L.	Chapha	Root, bark
12	<i>Carica papaya</i> L.	Papita	Seed paste
13	<i>Catharanthus roseus</i> L (G) Don	Sadabahar	Plant extract ,leaves
14	<i>Chenopodium album</i>	Bathua	Whole plant
15	<i>Curcuma longa</i>	Haldi	Roots
16	<i>Commiphora mukul</i> Engl. Syn. <i>C-wightii</i> Arnott.	Gugul	Roots ,bark and gums
17	<i>Coriander sativum</i> L.	Dhaniya	Fruits
18	<i>Cucurbita maxima</i> Duch.	Kaddu	Fruit juice, seeds
19	<i>Cucumis sativus</i> L.	Kakri	Seeds and fruits
20	<i>Cocus nucifera</i> I.	Narial	Endosperm
21	<i>Cuscuta reflexa</i> Roxb.	Amarbel	Plant extract
22	<i>Datura metel</i> L.var. <i>fastuosa</i>	Datura	Plant extract
23	<i>Daucus carota</i> L.	Gajar	Roots and latex
24	<i>Euphorbia hirta</i> L.		Latex
25	<i>Gossypium herbaceum</i> L.	Cotton	Seeds
26	<i>Glycine max</i> L.	Soyabean	Seeds
27	<i>Jatropha curcus</i> L.	Ratanjot	Latex
28	<i>Lantana camera</i> L.	Kuri	Plant extract
29	<i>Nerium indicum</i> Mill. Syn. <i>N-odorum</i> Sonand	Kaner	Leaves
30	<i>Ocimum sanctum</i> L.	Tulsi	Seed mucilage
31	<i>Papaver somniferum</i> L.	Afim	Latex from unripe carpel
32	<i>Raphanus sativus</i> L.	Muli	Leaves
33	<i>Ricinus communis</i> L.	Arandi	Seed oil
34	<i>Solanum indicum</i> L.	Jangli baingun	Plant extract
35	<i>Withania somnifera</i> Dunol.	Ashagandh	Roots
36	<i>Zingiber officinale</i> Rosc.	Adrak	Rhizome

## Medicinal plant

Literature survey	Chemical abstract	Collection	Identification
Drying	Chopping	Soaking	Filtration
Solvent removal	Crude extract	Partitioning	Chromatography
VLC	Colum chromatography	TLC	Flash chromatography
HPLC	Mixing of similar fraction	Further purification	Charcoaling and washing
Structure elucidation	mass	spectroscopy	UV
IR	NMR	2D-NMR	Crystallization
X-ray	Melting point	Optical rotation	Related literature
Data matching	Chemical degradation	Chemical reaction	Derivatization
Ozonolysis	Epoxidation	Hydrolysis	Aetylation
Other reaction	Conformation	Stereochemistry	Pharmacology
Structure activity relationship	Setting of MIC	Patent	Publication

## Conclusions

1) India is among the traditional producer and exporter of several medicinal plants. Lack of basic information on different parameter of crop productivity is a limiting factor in this group of plants. There is therefore need for intensive agricultural studies leading to the genetic improvement and cultivation methods for expansion of area under medicine and medicinal plants.

2) The introduction of medicinal plants into the cropping patterns of farming communities especially in dry land and wasteland areas could provide a strong thrust to the need for soil and water conservation, as well as provide returns and indirectly help in *ex-situ* conservation of these crops to a significant extent.

3) By drawing up a comprehensive strategy for the cultivation and conservation of medicinal plants in league with the forest department, many threats outlined earlier could turn into opportunities for successful commercial exploitation without tampering with the interest of the communities involved in the collection of plants.

4) India, with its vast biodiversity and potential for commercial exploitation, could become a world leader in the supply of raw material for the phytopharmaceutical industry.

5) Conservation of medicinal plants need integrated approach. A multidisciplinary action and close collaboration among planners, administrators, scientists, developmental agencies, user industries and growers required.

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