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Ethnomedicinal Plants Having Anticancer Potential: A Review

Botany

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VARSHA NIGAM Assistant Professor, Department of Botany, Guru Nanak Khalsa College, Yamuna Nagar -135001,Haryana.

ANKITA RANA Assistant Professor, Department of Botany, D. A. V. College For Girls, Yamuna Nagar -135001, Haryana.

ABSTRACT

Cancer is a major public health burden in both developed and developing countries. It is the second largest common disease spread world-wide, where one in four deaths is due to cancer. Medicinal herbs have been on the forefront whenever we talk about anticancer remedies, Herbal medicines have a vital role in the prevention and treatment of cancer. India is the largest producer of medicinal plants and these plants may promote host resistance against infection by re-stabilizing body equilibrium and conditioning the body tissues. Several reports describe that the anticancer activity of medicinal plants is due to the presence of antioxidants in them rightly called the "Botanical garden of the World". This review had given list of some plants possessing anticancer activity which will be useful to treat various types of cancer. Most findings are preliminary and further studies are required for clinical applications.

Introduction:

Cancer is a major health problem worldwide. Many studies have been conducted to investigate the prevention and treatment of cancer. Till date, no absolute preventative and curable agent has been found.1 Cancer is the abnormal growth of cells in our bodies that can lead to death. Cancer cells usually invade and destroy normal cells9. Cancer is a major health problem and a leading cause of death worldwide. One-third of the world's population suffers from cancer and it is responsible for one-fifth of all deaths2. In 2007, 11.3 million people developed cancer and 7.9 million died because of cancer3. Plants have been used for the treatment of various diseases for thousands of years. Terrestrial plants have been used as medicines in Egypt, China, India and Greece. Now, an impressive number of modern drugs have been developed from the plants. Plant secondary metabolites have proved to be an excellent reservoir of new medical compounds8.

TYPES OF CANCERS 4,18

1) Cancers of Blood and Lymphatic Systems:

a) Hodgkin's disease, b) Leukaemia, c) Lymphomas, d) Multiple myeloma, e) Waldenstrom's disease

2) Skin Cancers: a) Malignant Melanoma

3) Cancers of Digestive Systems:

a) esophageal cancer, b) Stomach cancer, c) Cancer of pancreas, d) Liver cancer, e) Colon and Rectal cancer, f) Anal cancer

4) Cancers of 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 5

1) Viruses such as Epstein-Barr-Virus (EBV), Hepatitis-B-Virus (HBV), Human Papilloma Virus (HPV).

2) Environmental and occupational exposure such as ionizing, UV radiation, exposure to chemicals including vinyl chloride, benzene and asbestos.

3) Life style factors such as high-fat, low fiber diets, tobacco, ethanol etc.

4) Medication such as alkylating agents and immunosuppressant's.

5) Genetic factors such as inherited mutations, cancer causing genes, defective tumor suppressor genes.

Significance of Herbs in Cancer Therapy:

Plant derived phytochemicals possessing anticancer activities have received considerable attention in recent years due to the adverse effects produced by chemotherapy and radiation therapy. Phytochemicals derived from traditional medicinal plants have been found to posses anticancer and chemo protective effects. They are safer for long-term use in cancer patients. They provide nutrition and reduce the side effects of conventional cancer therapy due to effective antioxidant activity6.

Table 1: Plants with Anti-Cancer activity.6,9,10,11,12,13,14,15,16,17,18,20,21,22,23

S.no.	Botanical name	family	Phytochemicals	Action against specific cancer
1	*Alpinia galangal* Willd.	Zingiberaceae	Acetoxy-chavicol-acetate (ACA)	cancers of breast,lung, stomach, colon, prostate, myeloma and leukaemia
2	Aphanamixis polystachya	Meliaceae	amooranin	Breast & cervical cancer

3	Andrographis paniculata Wall.	Acanthaceae	andrographolide	Ovary, colon, kidney cancer
4	Allium cepa Linn.	Liliaceae	Diallyl sulphide, quercetin, allicin, allin	Stomach cancer
5	*Allium sativa* Linn.	Liliaceae	Allin, allicin, allicnase,s-allylc cysteine,diallyl disulphide, methyl allyl trisulphide	Breast cancer Hepato carcinoma stomach, colon, esophagus, pancreatic cancer,
6	Aegel marmelos Roxb.	Rutaceae	lupeol	Breast cancer & malignant lymphoma
7	Aloe ferox Miller.	Liliaceae	Aloe-emodin, emodin, aloin acemannan	Anti angiogenic activity
8.	Aloe barbadenis Miller	*Liliaceae*	Aloe-emodin, emodin, aloin acemannan	Anti angiogenic activity
9	*Aglaila sylvestre* (M. Roemer) Merrill	Meliaceae	Silvestrol	Silvestrol exhibited cytotoxicity against lung and breast cancer cell lines
10	Asparagus Recemosus Willd.	Liliaceae	Saponin, Fructooligo saccharide	Leukemia
11	Betula Alba L.(birch)	Betulaceae	Betulinic Acid	prostate cancer
12	*Berberis vulgaris* Linn.	Berberi-daceae	berberine, berbamine, chelidonic acid, citric acid, columbamine, hydrastine, isotetrandrine, jacaranone, magnoflorine oxycanthine and palmatine,	prostate cancer, liver cancer and leukaemia, breast cancer
13	*Bleekeria vitensis* A.C. Sm	Apocynaceae	Elliptinium	breast cancer
14	Bacopa mon-nieri L.	Scropulara-ciae	Saponins-mannitol, Hersaponin, Monerin	Carcinosarcoma
15	Boerrhavia dif-fusa L.	Boraginaceae	Punarnavine, Boeravionones	Malignant melanoma, breast cancer
16	Crocus sativus L. Saffron	Iridaceae	Crocetin	Skin tumours, lung cancer
17	Colchicum autumnale L.	Liliaceae	colchicine,	chemotherapeutic properties
18	Chelidonium majus L.	Papaveraceae	Celandine, chelidonine	pancreatic cancer
19	Cannabis sativa L.	Cannabaceae		lung carcinoma
20	Combretum caf-frum	Combreta-ceae	Combretastatin A-4	colon, lung and leukemia cancers
21	Camellia sinen-sis L.	Theaceae	Epigallocatechin gallate	prostate, colon,skin and gastric cancers
22	Catharanthus roseus G.	Apocynaceae	Include 70 alkaloids, known as vinca alka-loids such as Vinblastine, Vincristine	Cancer of breast, ovary, cervix, lung, colon, rectum, testis, neuroblastoma, Hodgkin's disease, malignant lym-phoma,
23	*Curcuma longa* Linn.	Zinziber-aceae	Curcumin (Di-feruloyl-methane), Tumerone	Cancer of breast, lung, oesophagus, liver, colon, prostate, head & neck and skin.
24	Centaurea schis-chkinii	Asteraceae	schischkinnin	human colon cancer
25	Centaurea mon-tana	Asteraceae	montamine	human colon cancer
26	Carum carvi Linn.	Umbelliferae	carvone, limonene, dihydro-carvone and traces of carvacrol.	chemopreventive properties, inhibited tumorigenesis
27	Embilica offici-nalis Gartin	Euphorbi-aceae	Ellagic acid, gallic acid, embilicin	Liver cancer
28	*Erythroxylum pervillei* Baill	Erythroxy-laceae	Pervilleine-A	cytotoxic against a multidrug resistant (MDR) oral epidermoid cancer cell line (KB-V1)
29	Fragaria vesca Linn	Rosaceae	Flavonoid, tannin, borneol	Kidney & breast cancer
30	Gossypium *barbadense L.*	Malvaceae	gossypol	inhibits carcinogenesis
31	*Glycine max* Merril	Leguminosae	Zinc, selenium, vitamins (A, B1, B2, B12,C, D, E and K), amino acids, isoflavones, protease inhibitors,saponins, genistein & daidzein and phytosterols	cancers of the breast, uterus, cervix, ovary, lung,stomach, colon,pancreas, liver,kidney, urinarybladder,prostate, testis, oral cavity, larynx, andthyroid

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32	*Ginkgo biloba* Linn.	Ginkoaceae (Gymnosperm)	Ginkgolide-B, A, C and J	cancers of ovary, colon, prostate and liver, reduces side effects of chemotherapy & radiotherapy
33	Glycyrrhiza glabra Linn.	Fabaceae	glycyrrhetic acid,Licochalcone-A, Glycyrrhizin	breast, lung, stomach, colon, liver, kidney and leukaemia
34	Ilex paraguariensis (mate tea)	Aquifoliaceae	caffeic acid, chlorogenic acid, 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid and 4,5-dicaffeoylquinic acid	cancer, rheumatic arthritis and various neurodegenerative and pulmonary diseases
35	Linum Usitatissimum L.	Linaceae	Cynogenetic glycosides, Lignans	Breast cancer
36	Momordica Charantia L.	Cucurbitaceae	*l*Charantin, sitosterol, Ascorbigin	.Colon cancer, Leukemia
37	Nigella sativa Linn	Ranunculaceae	Thymoquinone. dithymmoquinone	Colon, prostate, pancrease, Uterus cancer, malignant melanoma
38	Ocimun sativum Linn.	Lamiaceae	Eugenol, linolenic acid, oleanic acid, orientin, vicenin, apigenin	Breast & liver cancer, fibrosarcoma
39	*Podophyllum peltatum* Linnaeus and *Podophyllum emodi* Wallich	Berberidaceae	Etoposide and teniposide are two semi-synthetic derivatives of epipodophyllotoxin from the roots of two spe of podophyllum	lymphomas and bronchial and testicular cancers
40	Pteris multifida Poir.	Pteridaceae	Ludongnin, isoneorautenol	Yoshidas sarcoma
41	Rubia cordifolia L.	Rubiaceae	*Manjitti* Rubiadin	Melanoma, Sarcoma, Lung carcinoma, Lymphatic leukemia
42	Solanum nigrum Linn.	Solanaceae	Flavonoids-quercetin, solasodine,solanine	Cyst cancer, choriocarcinoma,leukaemia
43	Trigonella foenum - graecum Linn.	Fabaceae	Galactomannan, disogenin, gitogenin, neogitogenin, homorientin saponaretin	neck squamous carcinoma, brain tumor, breast cancer
44	Tabebuia impetiginosa Mart. Ex Dc.	Bignoniaceae	Beta-Lapachone, Lapachol	pancreatic cancer
45	Tinospora cordifolia Willd.	Menispermaceae	Berberine, tinosporine, giloin, giloinin	Lung, cervix, throat cancer, malignant ascites
46	Taxus buccata L.	Taxaceae	*Thalisabathari* Taxanes,Taxol, Cepholomannine	Leukemia, Breast cancer, Sarcoma, Cancer of larynx, ovary and colon
47	Vitex negundo Linn.	Verbanaceae	Chrysoplenetin	Human pancreatic cancer. Effective against myelo suppression and anaemia during chemotherapy
48	Viscum album Linn	Viscaceae	Lectin alkalois, acetylcholine, lupeol, viscotoxin, viscumin	Malignant melanoma, lung metastasis, cervix & ovary cancer
49	Vitis vinefera L.	Vitaceae	Resveratrol	Breast cancer, Prostate cancer, Non –hodgkins lymphoma
50	Withania somnifera Dunal	Solanaceae	Withanone, withaferin A, saponins, ducitol	Breast, lung, colon & CNS cancer
51	Zingber officinale Rosc	Zingiberaceae	eshogaol	Ovary, rectum, urinary bladder cancer, neuroblastoma

Conclusion:

Medicinal plants have contributed a rich health to human beings. Plant extracts and their bioactive compounds present in them which are responsible for anticancer activity have to be screened for their valuable information. The toxic effect of these plants should also be elucidated. This review had given list of some plants possessing anticancer activity for various types of cancer and help others to explore herbs to further extent and its use in various other disease and toxicity studies along with clinical trials.

At present, lifestyle changes, such as healthy diet, exercise and weight control and so on, should be targeted in prevention programmes. Cancer is hoped to be completely eliminated in the future. Every effort to prevent cancer will be worthwhile and valuable.

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