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A BRIEF REVIEW OF PLANTS HAVING ANTI CANCER PROPERTY

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ABSTRACT

In this article an attempts have been made to review medicinal plants that can be used for its anticancer activity. The plant sources are likely to provide effective anticancer agents. Herbs have a vital role in the prevention and treatment of cancer. Examples are provided in this review of promising bioactive compounds obtained from various plants with medicinal and other uses. The phytochemical exploration of these herbs has contributed to some extent in this race for the discovery of new anticancer drugs. Because of various side effects more preference has gone to use of medicinal plants which has not been systemized. Although drug discovery from medicinal plants continues to provide an important source of new drug leads, numerous challenges are encountered including the procurement of plant materials and their selection.

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INTRODUCTION

For a long times plants have been provide essential nutritional values, medicinal properties and notable physiological effect to life and are a good source of food[1].

Traditional medicine (TM) refers to the application, approach, knowledge, and belief in incorporating plant or animal based properties in remedies, singularly or in combination, for the purpose of treating or preventing disease as well as to maintain the well-being of an individual. Population rise, inadequate supply of drugs, prohibitive cost of treatments, side effects of several allopathic drugs and development of resistance to currently used drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments[2]. As such herbal remedies have been used to cure a variety of disorders or conditions such as diabetes, cardiovascular problems, weight control, dermal infirmities, sexual malfunction, and of course cancer. According to the World Health Organization, more than 70% of the world's population uses TM in order to fulfill their health necessities [3].

The principles underlying herbal medicines are relatively simple, although they are quite distinct from conventional medicine and herbal medicine[4]. India is a rich source of medicinal plants and a number of plant extracts are used against diseases in various systems of medicine such as ayurveda, unani and siddha. Only a few of them have been scientifically explored. Plant derived natural products such as flavanoids, terpenes, and alkaloids[5-7] and soon has received considerable attention in recent years, due to their diverse pharmacological properties including cytotoxic and cancer chemo preventive effects[8].

The natural world has been providing life-saving antibiotics, nutritive supplements and our most potent anti-cancer drugs. The lush tropical rainforests and colorful coral reefs of our planet have long been a source of promise in the fight against cancer and other diseases. Natural products, especially those from plants, have been a valuable source of new cancer drugs for many decades. Medicinal plants are the most exclusive source of life saving drugs for the majority of the world's population. The use of plant products in the treatment of cancer has been of recent interest [9]. In the market, these products are offered as "natural products"[10].

Cancer is the abnormal growth of cells in our body that can lead to death. Cancer cells usually invade and destroy normal cells. More and more cancer research works have been done and yet we do not understand exactly what cancer is?[11]. Cancer is the second leading cause of death in America. The major cause of cancer is smoking, dietary imbalances, hormones and chronic infections leading to chronic inflammation[12].

Plants used in cancer prevention and treatment:

Asparagus racemosus:

It is useful in treating tumors, nervous disorders, dyspepsia, tuberculosis, cough, bronchitis, gleet, gonorrhea, leucorrhoea, leprosy, epilepsy, fatigue, hyperacidity, colic haemorrhoids, hypertension, and abortion, cardiac and general debility [13].

Allium sativum:

It is used for the treatment of cardiovascular atherosclerosis, HIV drug-induced lipid disorders, cancer prevention, colds and the flu, and tick bite prevention [14]. It seems to be active against erythroleukemia as well as breast and prostate cancer cells [15].

Astragalus gummifera:

It inhibits cancer cell growth [16] and used in treating the carcinogenesis.

Bacopa monniera:

The plant is anticancerous and improves learning ability. The plant is astringent, bitter, sweet, cooling, laxative, intellect promoting, anodyne, carminative, digestive, anti-inflammatory, anticonvulsant, depurative, cardio tonic, bronchodilator, diuretic, emmenagogue, sudorfic, febrifuge and tonic [2].

Bleekeria vitensis:

It is widely used in Europe in the treatment of advanced breast cancer [18]. This herb is also used to treat fever, vomiting, and oral inflammation [19]. Ellipticine, isolated from a medicinal plant.

Arachis hypogaea:

It is used to lower cholesterol, aid in weight loss, or prevent cardiovascular conditions and cancer [20].

Aronia melanocarpa:

Aronia melanocarpa has a high concentration of polyphenols and anthocyanins, stimulating circulation, protecting the urinary tract, and strengthening the heart. Its rich antioxidant content may be beneficial as a dietary preventative for reducing the risk of diseases caused by oxidative stress. Several investigators reported to treat conditions such as colorectal cancer, colon cancer, cardiovascular disease chronic inflammation, gastric mucosal disorders [peptic ulcer], eye inflammation [uveitis] and liver failure [21].

Brassica oleracea:

It is used for gastrointestinal disorders, asthma, morning sickness, and preventing osteoporosis, individuals also use it to prevent lung, stomach, colorectal, breast, and other cancers Several studies reported that this may have anticarcinogenic properties[20].

Camellia sinensis:
It is used to prevent prostate, colon, and gastric cancers. It is also used to prevent skin cancer or damage from ultraviolet radiation. It seems to reduce the risk of some cancers by preventing blood vessel growth in tumors [22].

Catharanthus roseus:
It is one of the very few medicinal plants, which has a long history of uses as diuretic, antidysenteric, hemorrhagic and antiseptic. It is known for use in the treatment of diabetes in Jamaica and India. The alkaloids vinblastine and vincristine present in the leaves are recognized as anticancerous drugs. Vinblastine is used in combination with other anticancer agents for the treatment of lymphocytic lymphoma, Hodgkin's disease - cancer affecting lymph glands, spleen and liver, testicular carcinoma and choriocarcinoma. Vincristine is used in acute leukemia, lymphosarcoma and Wilm's tumour. Vinblastine and vincristine are primarily used in combination with other cancer chemotherapeutic drugs for the treatment of a variety of cancers, including leukemia's, lymphomas, advanced testicular cancer, breast and lung cancers, and Kaposi's sarcoma [23].

Asparagus officinalis:
Leung and Foster reported that this possess cancer preventing property. It also has a role in controlling urinary tract infections [16].

Crocus sativus:
It helps in increasing white blood cell count and disinfects secretions, including mucus, sweat and urination. It also increases appetite, clears the lungs, and helps heal the skin and mucous membranes. It is commonly used for cough and cold, decreased appetite and general weakness and also in the treating cancer [24].

Curcuma longa:
It is used to manage gastrointestinal discomfort and colorectal cancer [19]. This herb may have bile-stimulating, liver-protectant, antioxidant, and anticancer effects [25].

Chrysanthemum morifolum:
This may reverse precancerous gastrointestinal lesions [26].

Coleus forskholii:
It is useful in the treatment of cancer, congestive heart failure [26-27]. The active principle of Coleus forskohlii, forskolin, increase of cyclic AMP levels in the culture medium of human prostatic cancer cells thereby cellular growth of the cancer found inhibited. This will be a possible new, safe approach to prostatic carcinoma therapy [26].

Datura metal:
The plant or the different alkaloids have anticancerous, antitumour activities and it has narcotic, anthelmintic, spasmolytic anaesthetic, sedative, ophthalmic, antirheumatic, antiasthmatic, antidiarrhoeal and anticatarrhal activities [28]. Leaf is antitumour, antirheumatic and vermicide. Flower is antiasthamatic, anaesthetic and is employed in swellings and eruptions on face. Fruit juice is used in earache and seed decoction in ophthalmic. The alkaloids of pharmaceutical interest present in the plant are hyoscyamine, hyoscine and meteloidine.

Dysoxylum binectariferum:
It is an ayurvedic plant used for rheumatoid arthritis. Rohitukine was isolated as the constituent responsible for anti-inflammatory and immunomodulatory activity Flavopridol, was found to possess tyrosine kinase activity and potent growth inhibitory activity against a series of breast and lung carcinoma cell lines. It also showed broad spectrum in vivo activity against human tumor xenografts in mice, either alone or in combination with other anti-cancer agents, against a broad range of tumors, including leukemia, lymphomas and solid tumors [22].

Ginko biloba:
It is used to treat conditions like altitude sickness, asthma, depression, disorientation, headaches, high blood pressure, erectile dysfunction and vertigo. It has found to improve thinking, learning and memory in people with Alzheimer's disease (AD). This herb also improves blood flow. Suzuki et al., [29] reported that extract of leaves has anti cancer activity.

Kaempferia rotunda:
The tubers of Indian crocus are widely used as a local application for tumors, swellings and wounds. The tubers are antitumour, anti inflammatory,

sialagogue, emetic, and vulnerary. It also improves complexion and cures burning sensation [30-31].

Lagerstroemia speciosa: It is popular in treating kidney troubles and serves as an anti-diuretic and its bark extract is efficient to counter cancer cells [32].

Daphne genkwa:

The flower buds are used to control coughs. The buds are anticoagulant, antiseptic, antitussive [33-34]. They are used internally in the treatment of bronchitis, constipation, edema and skin diseases [35]. Kai et al.[36], reported antitumour, anti allergy and anti inflammatory activities.

Gloriosa superba:

The roots and rhizomes are used in traditional system of medicine. Rhizome is anticancerous, oxytocic, anti malarial, stomachic, purgative, cholagogue, anthelmintic, alterative, febrifuge and antileprotic. Leaf is antiasthmatic and anti inflammatory. Root shows antigonorrhoeic and antibiotic activity [37].

Larrea divaricata:

It is used to treat cancer, tuberculosis, and venereal disease [38]. It also has the potential for anticarcinogenic and anti mutagenic activity [39].

Lavandula angustifolia:

This plant can be used to prevent multiplication of cancer cells. In vitro and animal studies have shown anticancer activity of L. angustifolia [24].

Glycine max:

It is having protective action against breast cancer [40-42].

Gynostemma pentaphyllum:

Used to treat cancer, cardiovascular and gastrointestinal disorders, diabetes, and obesity, and for strengthening the immune system. It is also used as an anti-inflammatory agent, antioxidant, or detoxifying agent [19].

Mamordica charantia:

It has antimicrobial [43], antiviral (anti HIV) [44], antitumour [45] and antimutagenic [46] effects. In Mexico, the entire plant is used for dysentery; the root is a reputed aphrodisiac. In Peruvian herbal medicine, the leaf or aerial parts of the plant are used to treat measles, and all types of inflammation. In Nicaragua, the leaf is commonly used for stomach pain, fevers, colds, coughs, headaches, skin complaints, menstrual disorders, aches and pains, hypertension, infections, and as an aid in childbirth.

Olea europaea:

It is used to treat breast cancer [47], others take it to prevent colorectal cancer and in cardiovascular complications [48].

Rhus succedanea:

The fruit is used in the treatment of phthisis [49]. A wax from the fruits is used in ointments. An ethanolic extract of the leaves exhibits anticancer and antiviral activities [34]. Ethanolic extract of sap also has anticancer activity [50].

Oryza sativa:

It is used in the treatment of diabetes and hypertension, cardiovascular disease [19] and bowel cancer [51].

Terminalia paniculata:

The stem bark is anticancerous, diuretic, cardio tonic CVS active and shows antagonism of amphetamine hyperactivity. Flower is anticholerin [52].

Yucca glauca:

Yucca is used to treat arthritis, hypertension, headaches, diabetes, and gastrointestinal conditions [53-54]. It exhibit antitumor activity against B16 melanoma but not against L1210 and P388 leukemia in mice [24, 53-55].

Triticum aestrivum:

It is used to prevent colon cancer and other colon conditions [55-57]. It is also used in the prevention of breast cancer [58].

Podophyllum peltatum:

The plant has podophyllotoxin, can be used as cytostastic [59] and topically in the treatment of genital warts [60]. The plant has been used especially in the treatment of ovarian cancer [61]. Epipodophyllotoxin is an isomer of podophyllotoxin which was isolated as the active antitumor agent from the roots of Podophyllum species, Podophyllum peltatum Linn. [62].

Trigonella foenum - graecum Linn:

Flavanoids and catechins were first shown to be apoptotic in human carcinoma cells [63]. Similar observation has since been extended to

lung tumor cell lines [64], colon cancer cells, breast cancer cells, prostate cancer cells [65] stomach cancer cells [66] brain tumor cells, head and neck squamous carcinoma [67] and cervical cancer cells [68] quercetin, rutin, and other food flavanoids have been shown to inhibit carcinogenesis in animal models.

Pyrus malus:

It has been found to be active against lung, colon, breast and intestinal cancer [69].

CONCLUSION

Since a long time medicinal plants have been known to cure and treat various human disease. There are lots of medicinal plants available in nature which has the anticancerous properties and majority of them are still to be explored for its anti cancer property. So, considering the facts it is strongly recommended that there is an urge for these plants to be discovered so that the cancer could be totally eradicated.

REFERENCES

1. Dalziel T.M. The Useful Plants of West Tropical Africa. 3rd ed. Bradford and London: Watmought Ltd., Idle; 1973. p.526-530
2. Joy P.P., Thomas J., Mathew S., Jose G., Joseph J. Medicinal plants. In: Bose T.K., Kabir J., Das P., Joy P.P. Editors. Tropical Horticulture Vol. 2. Calcutta: Naya Prokash.; 2001. p.449-632.
3. Hernandez E.G., Contreras A.A., Santamaria A., Ramos R.R., Miranda A.A.C., Vega L.M.G., Saenz J.L.F., Aguilar F.J.A. Studies on Hypoglycemic Activity of Mexican Medicinal Plants. Proc. West Pharmacol. Soc. 2002; 45: 118-124.
4. An introductory overview seminars in oncology nursing, vol 21, No 3(August) 2005; 102-105.
5. Osawa T, Kawakishi S, Namiki M.In: Kuroda Y, Shankel , DM, Waters MD, Antimutagenesisand anticarcinogenesis mechanism II. Newyork: plenum; 1990.p.139-153.
6. Di Carlo G, Mascolo N, Izzo AA, CapassaoF. Flavanoids: old and new aspects of a class of natural therapeutic drugs life sci.1999:65: 337-353.
7. Keith MW, Sally AL, Michael WS, Thomas JG, Garry MM. Taxus Spp. Needles contain amounts of tax oil comparable to the stem bark of taxus brevifolia: analysis and isolation Nat prod.1990; 53:1249-1255.
8. Roja G, Heble MR. The quinoline alkaloid Camptothecin and 9-methoxy camptothecin from tissue cultures and mature trees of Nathapodytes foetida. Phytochemistry.1994; 36:65-66.
9. Bauer B.A. Herbal therapy: what a clinician needs to know to counsel patients effectively? Mayo Clin. Proc. 2000; 75(8): 835-841.
10. P.L.M . Diccionario de especialidades *farmacéuticas. México, D.F; 2003.*
11. Estrogen & Cancer Website,2006; www.womenshealth. Com,. www.amazon.com
12. Ames, B.N., Gold, L.S. and Willett, W.C., The causes and prevention of cancer.proc. Natt. Acad.Sci. USA, 1995, 92, 5258-5265.
13. Warrier P.K, Nambiar V.P.K., Ramankutty C. Indian Medicinal Plants. Vol. 1-5. Madras: Orient Longman Ltd.; 1993-1995
14. Bloch A.S. Pushing the envelope of nutrition support: complementary therapies. Nutrition. 2000; 16(3): 236-239.
15. Sigounas G., Hooker J., Angnostou A., Steiner M. S-allyl-mercaptocysteine inhibits cell proliferation and reduces the viability of erythroleukemia, breast, and prostate cancer cell lines. Nutrition and Cancer. 1997; 27: 186-191.
16. Leung A.Y., Foster S. Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics. 2nd ed. New York: John Wiley and Sons Inc.; 1996. p.113-114.
17. Cragg G., Suffness M. Metabolism of plant-derived anti-cancer agents. Pharmacol. Ther. 1988; 37: 425-432.
18. Gruenwald J., Brendler T., Jaenicke C. PDR for Herbal Medicines. 1st ed. Montvale, NJ: Medical Economics Co. Inc..; 1998. p.179-180.

19. Natural Medicines Comprehensive Database. Therapeutic Research National Faculty Database. Available at http:/www.naturaldatabase.com
20. Mouli K.C.a , Vijaya T. b, Rao S.D.c. Phytoresources as potential therapeutic agents for cancer treatment and prevention. Journal of global pharma technology, 2009; 1(1): 4-18
21. Gupta S., Ahmad N., Mukhtar H. Prostate chemoprevention by green tea. Seminars in Urologic Oncology. 1999; 17: 70-76.
22. Cragg G.M., Newman D.J. Plants as source of anticancer agents. J. Ethnopharmacol. 2005; 100(1-2): 72-79.
23. Abdullallaev J.F., Caballero O.H., Riveron N.L., Pereda M.R., Rivera L.R., Manuel H.J., Perez L.I., Espinosa A.J.J. Rev. Invest. Clin. 2002; 54: 430.
24. Facts and Comparisons. The Lawrence Review of Natural Products–Monograph System. St. Louis, MO: Wolter Kluwer; 2001. p.41.
25. Yu X.Y. A prospective clinical study on reversion of 200 precancerous patients with hua-sheng-ping. Zhongguo Zhong Xi Yi Jie He Za Zhi Zhongguo Zhongxiyi Jiehe Zazhi. 1993; 13(3): 147–149.
26. Vladimeer B., Majeed M., Nutrition Industry Executive, The Business Magazine for Dietary Supplement Industry Manufacturers; 2004.
27. James P.M. Coleus forskohlii: A nonstimulant herb with proven fat burning ability. Dynamic Chiropractic 2003; 21:12.
28. Thakur R.S., Puri H.S., Husain A. Major Medicinal Plants of India. Lucknow: CIMAP; 1989. p.21.
29. Suzuki R., Kohno H., Sugie S., Sasaki K., Yoshimura T., Wada K., Tanaka T. Preventive effects of extract of leaves of ginkgo (Ginkgo biloba) and its component bilobalide on azoxymethane induced colonic aberrant crypt foci in rats. Cancer Lett. 2004; 210(2):159-169.
30. Nagarjuna Research Foundation. Chengazhuneer Kizhangu. Express Week; dt.: 2/5/98.
31. Sivarajan V.V., Indira B. Ayurvedic Drugs and their Plant Sources. New Delhi: Oxford & IBH publishing Co. Ltd.; 1994. p.315.
32. Jowi A.C. National Research Council of the Philippines-Department of Science and Technology-NRCP-DOST. Available at http://nrcp.dost.gov.ph. 2008.
33. Yeung H.C. Handbook of Chinese Herbs and Formulas. Vol. 2. Los Angeles: Institute of Chinese Medicine; 1985. p.183.
34. Duke J.A., Ayensu E.S. Medicinal Plants of China. Vol. 2. Algonac: Reference Publications, Inc.; 1985. p.381.
35. Bown D. Encyclopaedia of Herbs and their Uses. London: Dorling Kindersley; 1995. p.53-100.
36. Kai H., Koine T., Baba M., Okuyama T. Pharmacological effects of Daphne genkwa and chinese medical prescription, Jyu-So-To. J. Pharmaceutical Soc., Japan. 2004; 124(6): 349-354.
37. Clewer H.W.B., Green S.J., Tutin F. Constituents of Gloriosa superba. J. Chem. Soc. 1915; 107: 835-846.
38. Anesini C., Ferraro G., Lopez P., Borda E. Different intracellular signals coupled to the antiproliferative action of aqueous crude extract from Larrea divaricata Cav. and nor-dihydroguaiaretic acid on a lymphoma cell line. Phytomedicine. 2001; 8(1): 1-7.
39. McDonald R.W., Bunjobpon W., Liu T., Fessler S., Pardo O.E., Freer I.K., Glaser M., Seckl M.J., Robins D.J. Synthesis and anticancer activity of nordihydroguaiaretic acid (NDGA) and analogues. Anticancer Drug Design. 2001; 16(6): 261-270.
40. Hakkak R., Korourian S., Shelnutt S.R., Lensing S., Ronis M.J.J., Badger T.M. Diets containing whey proteins or soy protein isolate protect against 7, 12-dimethylbenz(a) anthracene-induced mammary tumors in female rats. Cancer Epidemiology Biomarkers & Prevention. 2000; 9(1): 113-117.
41. Mc. Michael-Phillips D.F., Harding C., Morton M., Roberts S.A., Howell A., Potten C.S., Bundred N.J. Effects of soy-protein

supplementation on epithelial proliferation in the histologically normal human breast. Am. J. Clin. Nutr. 1998; 68(6): 1431-1435.
42. Petrakis N.L., Barnes S., King E.B., Lowenstein J., Wiencke J., Lee M.M., Miike R., Kirk M., Coward L. Stimulatory influence of soy protein isolate on breast secretion in pre-and postmenopausal women. Cancer Epidemiology, Biomarkers & Prevention. 1996; 5(10): 785-794.
43. Omoregbe R.E., Ikuebe O.M., Ihimire I.G. Antimicrobial activity of some medicinal plants extracts on Escherichia coli, Salmonella paratyphi and Shigella dysenteriae. Afr. J. Med. Sci. 1996; 25(4): 373-375.
44. Lee-Huang S., Huang P.L., Bourinbaiar A.S., Chen H.C., Kung H.F. Inhibition of the integrates of human immunodeficiency virus (HIV) type 1 by anti-HIV plant proteins MAP30 and GAP31. Proc. Natl. Acad. Sci. 1995; 92(19): 8818–8822.
45. Nagasawa H., Watanabe K., Inatomi H. Effects of bitter melon (Momordica charantia) or ginger rhizome (Zingiber offifinale Rosc.) on spontaneous mammary tu morigenesis in SHN mice. Am. J. Clin. Med. 2002; 30(2-3): 195-205.
46. Chiampanichayakul S., Kataoka K., Arimochi H., Thumvijit S., Kuwahara T., Nakayama H., Vinitketkumnuen U., Ohnishi Y. Inhibitory effects of bitter melon (Momordica charantia Linn.) on bacterial mutagenesis and aberrant crypt focus formation in the rat colon. J. Med. Invest. 2001; 48(1-2): 88.
47. C., Negri E., Franceschi S., Decarli A., Giacosa A., Lipworth L. Olive oil, other dietary fats, and the risk of breast cancer. Cancer Causes Control. 1995; 6(6): 545–550.
48. Stoneham M., Goldacre M., Seagroatt V., Gill L. Olive oil, diet and colorectal cancer: an ecological study and a hypothesis. J. Epidemio. Community Health. 2000; 54(10): 756-760.
49. Chopra R.N., Nayar S.L., Chopra I.C. Glossary of Indian Medicinal Plants. New Delhi: Council of Scientific and Industrial Research; 1956. p.77-100.
50. Wu P.L., Lin S.B., Huang C.P., Chiou R.Y.Y. Antioxidative and cytotoxic compounds extracted from the sap of *Rhus succedanea. J. Nat. Prod. 2002; 65(11): 1719-1721.*
51. Weisburger J.H., Reddy B.S., Rose D.P., Cohen L.A., Kendall M.E., Wynder E.L. Protective mechanisms of dietary fibers in nutritional carcinogenesis. Basic Life Sci. 1993; 61: 45-63.
52. Husain A., Virmani O.P., Popli S.P., Misra L.N., Gupta M.M., Srinvastava G.N., Abraham Z., Singh A.K. Dictionary of Indian Medicinal Plants. Lucknow: CIMAP; 1992. p.546.
53. Leung A.Y., Foster S. Encyclopedia of Common Natural Ingredients Used in Food, Drugs, and Cosmetics. 2nd ed. New York: John Wiley and Sons Inc.; 1996. p.113-114.
54. Newall C.A., Anderson L.A., Phillipson J.D. Herbal Medicine: A Guide for Health Care Professionals. London: Pharmaceutical Press; 1996. p.87-89.
55. Foster S., Duke J.A. A Field Guide to Medicinal Plants. New York: Houghton Mifflin; 1990. p.46.
56. Tyler V.E. The Honest Herbal. 3rd ed. Binghamton, NY: Pharmaceutical Products Press; 1993. p.158-169.
57. Govers M.J., Gannon N.J., Dunshea F.R., Gibson P.R., Muir J.G. Wheat bran affects the site of fermentation of resistant starch and luminal indexes related to colon cancer risk: a study in pigs. Gut. 1999; 45(6): 840-847.
58. Consensus Statement on Cereals, Fibre and Colorectal and Breast Cancers Proceeding of the European Cancer Prevention Consensus Meeting. Santa Margheritia, Italy. Eur. J. Cancer Prev. 1998; 7(2): S1-S83.
59. Blanchan N. Wild Flowers: An Aid to Knowledge of our Wild Flowers and their Insect Visitors. Project Gutenberg Literary Archive Foundation; 2002.
60. Moraes R.M., Lata H., Bedir E., Maqbool M., Cushman K. On american mayapple as practical source of podophyllotoxin. In: Janick J., Whipkey A. editors. Trends in New Crops and Uses. Alexandria, VA: ASHS Press; 2002. p.527-532.

61. Phillips R., Foy N. Deals with all types of herbs including medicinal, culinary, scented and dye plants. Excellent photographs with quite good information on each plant. London: Herbs Pan Books Ltd; 1990. p. 245.
62. Stahelin H. Activity of a new glycosidic lignan derivative (VP 16-213) related to podophyllotoxin in experimental tumors. Eur. J. Cancer. 1973; 9: 215-221.
63. Ahmad N, Gupta S, Mukhtar H (2000). Green tea polyphenol epigallocatechin – 3 - gallate differentially modulates nuclear factor kappa B in cancer cells versus normal c ells. Arch. Biochem. Biophys., 2000, 376: 338.
64. Yang G, Liao J, Kim K, Yurk ow E, Yang C (1998). Inhibition of growth and induction of apoptosis in human cancer c ell lines by tea polyphenols. Carcinogen., 19: 611.
65. Paschka A, Butler R, Young C (1998). Induction of apoptosis in prostate cancer cell lines by the green tea component, epigalloc atechin – 3 - gallate. Cancer Lett.,130: 1.
66. Okabe S, Ochiai Y, Aida M (1999). Mechanistic aspects of green tea as a cancer preventive: Effect of components on human stomach cancer cell lines. Jpn. J. Cancer, Res., 90: 733.
67. Masuda M, Suzui M, Weinstein I (2001). Effects of epigallocatechin-3- gallate on growth, epidermal growth factor receptor signaling pathways, gene expression, and chemo sensitivity in human head and neck squamous cell carcinoma cell lines. Clin. Cancer Res., 7:4220.
68. Ahn W, Huh S, Bae S (2003). A major constituent of green tea, EGCG, inhibits the growth of a human cervical cancer c ell line, CaSki cells , through apoptosis, G(1) arrest, and regulation of gene expression. DNA Cell Biol., 22: 217.
69. Review on: herbs as anticancer agents. Prema R, Sathish Sekar D, Chandra Sekhar K B Int. J Pharma &Int Res, Vol 1: (2): 2011, 105-108.

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