Natural Herbs as Anticancer Drugs

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Abstract : This article has been with the aim to review some medicinal plants used in various types of cancerous diseases in relation with treatment as well as prevention of cancer. as cancer is worldwide threat to human beings and there are no of therapies are available such as chemotherapy, antibiotic therapy, immunotherapy etc, but problem with these therapy are they are costly, side effect ,pain-full etc . Herbal treatment having less side effect and they are economic ,easily available .

Key word **- cancer ,herbal drugs , Bioactive compounds, medicinal plant.**

INTRODUCTION

Natural products especially 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 from ancient times and an impressive number of modern drugs have been developed from them. The first written records on the medicinal uses of plants appeared in about 2600 BC from the Sumerians and Acadians .[1]

Cancer cells usually invade and destroy normal cells. These cells are born due to imbalance in the body and by correcting this imbalance, the cancer may be treated. Ayurveda, a traditional Indian medical practice using plant drugs has been successful from very early times in using these natural drugs and preventing or suppressing various tumours with different lines of treatment.[2] In India, people of different ethnic groups inhabiting various terrains, possess their own distinct culture, religious rites, food habit and a rich knowledge of traditional medicine.[3] Plants keep on serving as could be allowed hotspots for new medications what's more, chemicals got from different parts of plants.[4] What's more, herbs have given us a portion of the essential life sparing medications utilized as a part of the armamentarium of cutting edge medicine.[5]

In recent years there has been a gradual revival of interest in the use of medicinal plants in the developing countries because herbal medicine have been reported safe and less or without any adverse effect especially when compared with synthetic drugs. Herbal medicines represent one of the most important fields of traditional medicines all over the world, to promote the use of herbal medicine and to determine their potential as a source of new drugs. It is essential to study medicinal plants which have folklore reputation in a more intensified way. Human beings have used the plants for medicinal purposes for centuries of the world including countries in the Indian sub-continent like India, Pakistan and Bangladesh [6].

The effort to find anticancer agents from higher plants was launched by the US National Cancer institute (NCI) in 1957. Today many of the most useful and curative anticancer drugs are derived from natural products. Since the initiation of program by NCI more than 35,000 plant species had investigated and resulted in the discovery of anticancer drugs such as Vincristine, Vinblastine, Taxol, Indicine - N - oxide, Etoposide analogs, Camptothecin and analogs etc.

India is the largest producer of medicinal plants and is rightly called the "Botanical garden of the World". The medicinal plants, besides having natural therapeutic values against various diseases, also provide high quality of food and raw materials for livelihood. Considerable works have been done on these plants to treat cancer, and some plant products have been marketed as anticancer drugs, based on the traditional uses and scientific reports. Medicinal plants have been stated [7] to comprise about 8000 species and account for approximately 50% of all the higher flowering plant species of India.

In other words, there are about 400 families of the flowering plants; at least 315 are represented by India. Medicinal properties of few such plants have been reported but a good number of plants still used by local folklore are yet to be explored. The Western use of such information has also come under increasing scrutiny and the national and indigenous rights on these resources have become acknowledged by most academic and industrial researchers. According to the World Health Organization (WHO), about three quarters of the world's population currently use herbs and other forms of traditional medicines to treat diseases. There are at least 250,000 species of plants out of which more than one thousand plants have been found to possess significant anticancer properties [8].

table 1: plants used in cancer treatment[9-35]

S. no.	Botanical Names	Family	Active constituent
1	Allium sativum	Liliaceae	Alliin, allicin alliin, alliinase
2	Actinidia chinensis	Actinidiaceae	Polysaccharide known as “ACPS-R”
3	Aloe ferox, Aloe barbadenis	Liliaceae	Aloe-emodin, emodin, aloin
4	Ananas comosus	Bromeliaceae	Bromelain
5	Angelica sinensis	Umbelliferae	Polysaccharide fraction “AR-4”
6	Annona species	Annonaceae	Acetogenins
7	Arctium lappa,	Compositae	Potent anticancer factors
8	Astragalus membranaceus	Papilionaceae	Swainsonine
9	Agapanthus africanus	Agapanthaceae	Isoliquiritigenin
10	Aglaila sylvestre	Meliaceae	Silvesterol
11	Betula utilis	Betulaceae	Betulin
12	Camellia sinensis	Theaceae	Epigallocatechin gallate
13	Catharanthus roseus	Apocynaceae	Vinblastine, Vincristine
14	Hedyotis diffusa	Oocystaceae	Lysine
11	Betula utilis	Betulaceae	Betulin
12	Camellia sinensis	Theaceae	Epigallocatechin gallate
13	Catharanthus roseus	Apocynaceae	Vinblastine, Vincristine
14	Hedyotis diffusa	Oocystaceae	Lysine
15	Colchicum luteum	Liliaceae	Colchicines demecolcine
16	Combretum caffrum	Combritaceae	Combretastatin
17	Corcus sativus	Iridaceae	Safranal, Crocetin, Crocin
18	Echinacea angustifolia	Asteraceae	Arabinogalactan
19	Fagopyrum esculentum,	Polygonaceae	Amygdalin, Rutin
20	Ginkgo biloba	Ginkoaceae	Ginkgolide-B, A, C and J
21	Glycine max	Leguminosae	Zinc, selenium, Vitamins (A, B1, B2, B12, C, D, E and K)
22	Glycyrrhiza glabra	Leguminosae	Glycyrrhizin
23	Gossypium barbadense	Malvaceae	Gossypol
24	Gyrophora esculenta	Umbilicariaceae	Polysaccharides β-glucans, α-glucans,
25	Lentinus edodes	Agaricaceae	Lentinan
26	Linum usitatissimum	Linaceae	Cynogenetic glycosides, Lignans
27	Mentha species	Labiateae	Monoterpene ketones
28	Ochrosia elliptica	Apocynaceae	Ellipticine and 9-methoxy ellipticine
29	Panax ginseng	Aralaceae	Ginsenosides, Panaxosides
30	Picrorrhizia kurroa	Scrophulariaceae	Picrosides I, II, III and kutkoside
31	Podophyllum hexandrum	Berberidaceae	Podophyllin,astragalin
32	Taxus brevifolia	Taxaceae	Taxanes, taxol cepholomannine
33	Withania somnifera	Solanaceae	Withanolides, Withaferin
34	Zingiber officinale	Zingiberaceae	Curcumin, gingerenone A, Gingeols, shogaols, zingerone
35	Colchicum autumnale	Liliaceae	Colchicine
36	Betula alba	----	Betulinic Acid
37	Camptotheca	Cornaceae	Camptothecia, Topotecan,CPT-11, 9-Aminocamptothecin

	acuminate		
38	Taxus baccata	Taxaceae	Docetaxel, Taxol
39	Cannabis sativa	----------	
40	Tabebuia impetiginosa, T. avellanedae	Cannabaceae	Beta-Lapachone, Lapachol
41	Podophyllum peltatum	Berberidaceae	Podophyllotoxin, Etoposide, Podophyllinic Acid, and Teniposide
42	Nothapodytes foetida	Icacinaceae	Acetylcamptothecin,
43	Heracleum persicum	Apiaceae	-
44	Gmelina asiatica	Verbenaceae	-
45	Adiantum venusutum	Adiantaceae	-
46	Anemopsis californica	Saururaceae	cymene, limonene, piperitone and thymol
47	Alangium salviifolium	Alangiaceae	quercitin, kaemferol
49	Aspidosperma tomentosum	Apocynaceae	-
50	Antiaris Africana	Moraceae	betulinic acid, 3β-acetoxy-1β,11α-dihydroxy-olean-12-ene, ursolic acid, oleanolic acid, strophanthidol, periplogenin,
51	Amoora rohituka	Meliaceae	-
52	Aegle marmelos	Rutaceae	Butylp-tolyl sulfide, 6-methyl-4-chromanone and 5-methoxypsoralen
53	Hibiscus mutabilis	Malvaceae	-
54	Arnebia nobilis	Boraginaceae	Arnebin
55	Aesculus hippocastanum	Sapindaceae	β-escin
56	Biophytum sensitivum	Oxalidaceae	Amentoflavone, Isoorientin, Orientin, vitexin, epicatechin, 1, 2 dimethoxy benzene, linalool oxide, linalyl, acetate, isophorone
57	Cuscuta reflexa	Convolvulaceae	Kaempferol, uercitin, hydroxycinnamic acid, scoparone, melanettin, quercetin, hyperoside, cuscutalin, iso-rhamnetin-3-0-neohesperidoside, apigenin-7-0-rutinoside, lycopene, amarbelin
58	Caesalpinia bonducella	Caesalpiniaceae	Bonducin, Caesanol1, 6ß, 7ß dibenoyloxyvoiacapen-5-a-ol, Bonducellpins A, B, C, D
59	Cassia fistula, Cassia tora, Cassia absus , Cassia auriculata , Cassia senna	Fabaceae	Anthraqquinone, fistullic acid, rhein glucoside, phlobaphenes, emodin, chrysophanic acid, fistuacacidin, hexacosanol, obtusin, chryso-obtusin, obtusifolin, ononitol monohydrate, rubrofusarine, rubrofusarine triglucoside, non rubrofusarin gentiobioside ,panwar gum, chaksine, isochaksine, hydnocarpin, apigenin, raffinose, di-(2-ethyl) hexyl phthalate, sennoside A,B,C,D, palmidin A, rhein , aleo-emodin, myricyl alcohol, salicylic acid, barbaloin
60	Cleome gynandra	Capparidaceae	Centaureidin, myricitin, taraxasterol, capric acid, lauric acid, glucocapparin, hexacosanol, viscosic acid, viscosin, glucoiberine, neoglucobrassicin, glucobrassicin
61	Centella asiatica	Apiaceae	Asiatic acid, madecassic acid, asiaticoside, asiatoside, madicassoside, brahminoside, brahmoside, centelloside
62	Cola nitida	Malvaceae	1,3,7-trimethyl-1H-purine-2,6(3H,7H)-dione, n-Hexadecanoic acid
63	Cirsium japonicum	Asteraceae	Cireneol G, ciryneol H, ciryneol C, p-coumaric acid, syringing, linarin, ciryneone F, ciryneol A
64	Citrus medica	Rutaceae	Methyl ferulic acid,dihydro-N-caffeoyltyramine, acacetin, ß-ecdysterone, (-)-balanophonin, p-methoxy cinammic acid, umbelliferone, ferulic acid, diosmetin, 4-methoxy salicylic acid
65	Cissus quadrangularis	Vitaceae	Iridoids, stilbenes
66	Clerodendrum serratum , Clerodendrum viscosum	Verbanaceae	Hispidulin, cleroflavone, apigenin, scutellarein, serratagenic, acteoside, verbascoside, clerodermic acid, clerodolone, clerodone, clerosterol
67	Crinum asiaticum	Amaryllidaceae	Criasiaticidine A, lycorine, pratorimine, crinamine, hippadine, hamayane, plaforinine, norgalanthamine, epinorgalanthamine
68	Daucus carota	Apiaceae	Carotene, carotin
69	Embelia ribes	Myrsinaceae	Embelin, christembine
70	Jatropha curcas	Euphorbiaceae	5α-stigmastane-3,6-dione, nobiletin, ß-sitosterol, taraxerol, jatropholone, jatropholone B, caniojane, daucosterol

71	Kaempferia galangal , Kaempferia rotunda	Zingiberaceae	Et-p-MeO-trans-cinnamate, crotepoxide
72	Lanata camara	Verbanaceae	Valecene, isocarypohyllene, bicyclogermacrene, germacrene D
73	Lens culinaris medikus	Fabaceae	-
74	Limonia acidissima	Rutaceae	Bergapten, orientin, vitedin, marmin, feronolide, feronone, feronialactone, geranyl umbelliferone, marmesin, ursolic, flavanone glycoside-7-O-methylporiol-4'-ß-xylopyranosyl-D-glucopyranoside
75	Macrotyloma uniflorum	Fabaceae	Psoralidin, agglutinin, pyroglutamylglutamine
76	Mimosa pudica	Mimosaceae	Mimosine, 2-mercaptoaniline
77	Nicotiana tabacum	Solanaceae	Rutin, chlorogenic acid, glutamic acid, anabasine, myosmine, cotinine, tabacinine, tabacine, anthalin, nicotelline, nicotianine
78	Rhinacanthus nasuta	Acanthaceae	Rhinacanthin, rhinacanthin-C, rhinacanthin-D.
79	Zanthoxylum armatum	Rutaceae	α-amyrin, armatonaphthyl arabinoside, 1-linoleo-2,3-diolein
80	Xanthium strumarium	Compositae	Spathulenol, α-cadinol, α-muurolene, copaene
81	Salvadora persica	Salvadoraceae	Salvadoricine, salvaoside, salvadoraside, manisic acid, salvadourea [1,3-bis(3-methoxy-benzyl)-urea]
82	Symplocus cochinchinensis	Symplocaceae	Phloretin-2-glucoside
83	Vernonia cinerea	Asteraceae	Luteolin-7mono-beta-D-glucopyranoside, lupeol acetate
84	Vitex trifolia	Verbanaceae	Artemetin, 7-desmethyl emetin, sabinene, α-pinene, caryophyllene, vitricin
85	Solanum nigrum	Solanaceae	Diosgenin
86	Tinospora cardifolia	Menispermaceae	COlumbin, tinosporaside, jatrorhizine, tembeterine, tinocordifolioside, tinosporic acid, tinosporal, tinosporon
87	Momordica dioica	Cucurbitaceae	Momordicin, momodicaursenol, gypsogenin
88	Cynodon dactylon	Poaceae	Ortho hydroxyphenyl acetic acid, syringic acxid, para coumaric acid
89	Drosera indica	Droseraceae	Rossoliside, hyperoside
90	Barleria grandiflora	Acanthacae	Iridoids, acetylbarlerin, scutellarein-7-rhamnosyl.
91	Terminalia chebula	Combretaceae	Arjunglucoside I, arjungenin, chebulosides I and II, chebulin, 2,4-chebulyl-ß-D-glucopyranose, chebulinic acid, chebulic acid, terchebin
92	Cucurbita maxima	Cucurbitaceae	Cucurbitacin, cucurbitin, pheophytin A, niacin, thiamine

MEDICINAL PLANTS WITH ANTICANCER ACTIVITY

Allium Sativum (Allicin):

Allium sativum (Garlic, Lasun) is used to treat a wide variety of diseases in India. Allicin is a major component of raw garlic and ajoene is a product of the rearrangement of allicin. Its cytotoxic effect has been tested using human primary fibroblasts, a permanent, nontumorgenic cell line derived from baby hamster kidney cells and a tumorgenic lymphoid cell line derived from a Burkitt lymphoma. The cytotoxic action was in the range 2-50 µg/ml.Some organo-sulfur compounds from garlic, like S-allylcysteine, are reported to retard the growth of chemically induced and transplantable tumors in several animal models.[36] Administration of garlic (250 mg/kg, p.o., thrice a week) in male wistar rats, has been significantly suppressed 4-nitro quinoline-1-oxide induced tongue carcinogenesis as revealed by the absence by the carcinomas in the initiation phase and their reduced incidence in the post initiation phase.[37]

Actinidia chinensis: Actinidia chinensis root are used by the Chinese physicians in the treatment of cancer. Actinidia chinensis contains a polysaccharide known as "ACPSR" that possesses immune-enhancing and anticancer activities [38].

Aegle marmelos: Lupeol, isolated from Aegle marmelos, possesses strong anticancer activity against breast cancer, malignant lymphoma, malignant melanoma, malignant ascites and leukaemia. Aegle marmelos possesses significant antioxidant activity and reduces side effects of chemotherapy and radiotherapy [39].

Agave americana: The ethanolic extract of A. americana leaves has a cytotoxic and antitumor activity. Leaf contains steroidal saponin, alkaloid, coumarin, isoflavonoid, hecogenin and Vitamins (A, B, C). Therefore, this plant has potential to be utilized for the development of novel anticancer drug leads [40].

Aloe vera: Aloe vera contains aloe-emodin, which activates the macrophages to fight cancer. Aloe vera also contains acemannan, which enhances activity of the immune cells against cancer [41]. Aloe vera is found to inhibit metastases [42].

Bacopa Monnieri

It belongs to the Scrophulariaceae family and found throughout the plains in India. It is reported to contain tetracyclic triterpenoid saponins, bacosides A and B, herpestine,
brahmine, flavonoids, stigmasterol [43]. Stigmasterol is known to possess anticancer activity by inducing apoptosis mediated by the activation of protein phosphatase 2A by ceramide. Study conducted by Ghosh [44] evaluated the antitumor activity of stigmasterol isolated from Bacopa Monnieri on Ehrlich Ascites Carcinoma in swiss albino mice and found that stigmasterol enhanced the life span of tumor bearing mice by decreasing the tumor volume and viable cell count.

Bidens Pilosa

It belongs to the Asteraceae family and native to the America. It contains polyacetylenes, flavonoids, phenylpropanoids terpenoids, and others compounds. Phenyl-1, 3, 5-heptatriyn
possesses toxicity profile on normal blood cells in erythrocyte osmotic fragility experiments along with other extracts [45]. Hexane, methanol and chloroform extracts of Bidens pilosa and their fractions were tested on various cancer cell lines. Results showed the antitumor activity of extracts among which hexane extract showed maximum activity [46].

Catharanthus roseus

It belongs to the Apocynaceae family and commonly known as rosyperiwinkle or Madagascar periwinkle. Its main compound is alkaloids, and used for the circulatory diseases treatment and provide relief to the normal cerebral blood flow obstruction. Vinblastin and vincristine are the two well-known compounds which significantly effects against the human neoplasm. Vincristin sulfate arrest mitosis and utilized for the treatment of acute leukemia in children and vinblastin sulfate is utilized for the treatment of choriocarcinoma, lymphosarcoma, neuroblastoma and carcinoma of lung, breast and other organs [47].

Centella asiatica

It belongs to the Apiaceae family and commonly known as brahmamanduki in Hindi, mandukaparni in Sanskrit and pennywort in English. It is commonly found in India, Australia, Pacific Islands, New Guinea, Iran and Malaysia. It contains numerous compounds such as asiaticoside, pectic acid, hydrocotyline, sterol, flavonoid, vallerine, ascorbic acid and
thankunosides [48]. Partially purified fraction of Centella asiatica suppressed mouse lung fibroblast cell proliferation and oral administration slowed the solid development and ascites
tumours [49]. Pre-treatment with this plant increase the survival time of irradiated animals and show protection against radiation induces damage in liver [50].

Conclusion: In this review an attempt to describe the anticancer activity of various medicinal plants such as **Allium Sativum (Allicin):,** Solanum nigrum ,Tinospora cardifolia ,Momordica dioica, Crinum asiaticum ,Cynodon dactylon ,Daucus carota,Jatropha curcas,,Embelia ribes ,Centella asiatica ,Cola nitida ,Cirsium japonicum, , Cissus quadrangularise, etc are included in this article .

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