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A COMPREHENSIVE REVIEW ON NATURAL SOURCES AGAINST CANCER

Kishore Mendam*, V. Mangesh, S.Vamshi, S. Jithender Kumar Naik

Toxicology Lab, Department of Zoology, Osmania University, Telangana, India.

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***Correspondence for Author**
Kishore Mendam
Toxicology Lab,
Department of Zoology,
Osmania University,
Telangana, India.

ABSTRACT

This article review on some medicinal plants used for the prevention and treatment of cancer among population. Many of the environmental pollutants, drugs, chemicals, residues of pesticides and toxins present in food are common carcinogenic agents of cancer in human population. Herbs are play a vital role in prevention and treatment of several diseases. Medicinal plants and their products cure various diseases including cancer without causing toxicity. Hence there is a need to find natural anti-carcinogenic agents having the anti-cancer potential to prevent cancer. Plants have a long history of use in the treatment of cancer. A number of scientific investigations have highlighted the importance and contribution of many plant families are used as medicinal plants. Medicinal plants play a vital role for the development of new drugs. The herbal medicines (or) natural drugs are plant derived material or preparations, which contain either raw or processed ingredients from one or more plants. These compounds have been used as natural drugs, either in their original or Semi-Synthetic form. This review summarizes some important pharmacological and preliminary studies on anti cancer potential medicinal plants, source , products and their physiological activities or pharmacological activities, which can be investigated further to achieve lead molecules in the search of modern herbal drugs to treat several diseases. The continued search for natural medicines is necessary for finding additional sources of active components that are suitable for clinical application.

KEYWORDS: medicinal plants, Cancer, natural drugs.

INTRODUCTION

Complementary and Alternative Medicine (CAM) is a group of diverse healthy care and medicinal practices and products that are not generally considered to be part of conventional medicine and that is not integrated in to the dominant health care system. Sometime other names used it describe this health care practices include "non conventional medicine", "natural medicine" and "holistic medicine ".[1] There are several modalities of CAM such as chiropractics and herbal medicine etc.[2] Herbal medication is the most popular form of traditional medicine (TM) .The provision of effective and safe traditional medicine and /or complementary and alternative medicine therapies could become a critical tool to increase access to health care. Botanical Scientists are identified around 3, 50,000 plant species. In these only 20-30% are investigated for their therapeutic effect ,and 5-10% of them are used in different diseases as traditional medicines.[1] According to the appointed world committee of medicinal plants ,378 plants are investigated as authentic medicinal plants,245 medicinal plants have official monographs available in well known pharmacopeias and WHO guidelines.[3]

Several plants used in native folk medicine around the world have been a good source of therapeutic agents. More than half of the commercially available drugs are plant derived or mimics of plant derived substances.[4&5] Plants have chemical define mechanisms that synthesize a variety of compounds and secondary metabolites that can be used to perform important biological functions and to defend against attack from predators. Many of these plant derived substance or phytochemicals have useful effects, but some can have adverse of lethal effects on humans.[6] (Humans have used plants as diet and natural medicines since ancient times. Natural medicine safer than synthetic drugs.[7] Several medicinal plants have may pharmacological activities like anti inflammatory activity anti diabetic activity, antifilarial activity, analgesic activity, anti microbial activity and many more.[8]

Natural medicines have been used as anti cancer agents.[7] Research on medicinal plants and their derivatives has show that they are very important source of effective anti tumor agents. More than half of the drugs use in cancer treatment is derived from medicinal plants as natural soruces.[9] Complementary and alternative medicine (CAM) has played a important role in cancer treatment. In 1999, the National Institutes of Health (NIH) created the National center for complementary and Alternative Medicine (NCCAM) in recognition of this growing field.[10]

An alternative medicine is used instead of conventional medicine and alternative therapy is using a special diet to treat in place of undergoing chemo therapy, surgery or radiation that has been recommended by a conventional doctor. Cancer is the abnormal growth of cells in our body that can cause to death cancer cells are usually invade and destroy normal cell.[11]

The group of substances or chemicals or factors cause cancer in human and animals are collectively referred to as carcinogens. Carcinogens are involved in carcinogenesis, mutagenesis and genotoxicity. Carcinogens are the physical, chemical and biological agents that can cause cancer. The physical agents like ultraviolet (UV) and X-rays cause the deletion of nucleotides. The physical agents produce lesions in DNA including DNA base damage, dimerisation of DNA bases and breakage of DNA strand. Chemical agents like Asbestos ,Benzene and Vinyl Chloride etc.,and Biological agents as Epstein-Bar – virus(EBV),Human papilloma virus (HPV) etc. ,cause cancer. Many extrinsic and intrinsic factors induce the process of carcinogenesis.[12] Carcinogenesis is a multistage process by which a normal cell is transformed into a cancerous cell. Transformation involves initiation, typically from DNA damaging agents; promotion, during which cell proliferation is increased and progression, involving additional genetic alterations.[13] Carcinogenic includes three steps initiation, promotion and progression.[12]

Initiation: It is an irreversible process and begins when the cells in normal tissues are exposed to a carcinogen. It leads to genomic DNA damage that remains un-repaired and cause to mutation.

Promotion: It is expansion of the damaged cells to form an actively proliferating multi cellular pre-malignant tumor cells.

Progression: It is an irreversible process and tumor cells grow and invade into the surrounding normal tissue or organs.

There are four cancer causing genes are Oncogenes, tumor suppressor genes, Suicide genes and DNA-repair genes also cause cancer.[14] Anti carcinogenic agents can prevent the transformation of a Pro-carcinogenic substance into carcinogenic substance or (and) inactive the carcinogen or (and) prevent the reaction between genomic DNA and mutagen. In another way anti carcinogens may induce, repress or inactivate indirectly or directly the enzymes of the DNA repair.[15]

Causes of cancer[14]

1) Environmental and occupational exposure as ionizing, UV radiation, exposure to chemicals including Benzene, Asbestos and vinyl chloride.
2) Medication such as alkylating agents and immunosuppressant's.
3) Viruses such as Epstein – Virus ,Human papilloma virus ,Hepatitis-B-virus
4) Genetic factors such as inherited mutations, cancer causing genes, defective tumor suppressor genes.
5) Life style factors like high-fat, low fiber diets, tobacco, ethanol etc.

Method: Medicinal herbs are selected through the study of their literature from the online journal and publications. The collected literature of the medicinal plants related to the plant family, source or part are used , uses or physiological activities or pharmacological activities and plant derivative compounds are put in tabular form for the analyzation.[16]

Table-1: Some Medicinal Plants Have Anti Cancer Potential

S.No	Plant Name	Family	Component	Parts used	Pharmacological activity/uses
1	*Cynara Cardunculus*	Compostae	α &β amyrin ,taraxasterol and Ψ – taraxosterol	Flowers	Suppressed tumor promotion[17]
2	*Vitis vinifera L.*	Vitaceae	Resveratrol, por anthocynidins	Grape skin ,seeds	Inhibit tumor promotion , anti oxidant[18,19,20]
3	*Rosemarinus officnalis L.*	Labiatae	Ursolic acid carnosol	Oil	Suppressed tumor promotion , analgesic, treat headaches, and epilepsy[21]
4	*Perilla frutescens*	Labiatae	Luteolin, Rosmarinic acid and Caffeic acid	Seeds	Inhibit colon carcinogenesis[22,23]
5	*Chrysantyhemum*	Compositae	Triterpenoids, heliantriol C.	Flowers	Inhibit tumor promotion , used in hypertention , angina, coronary artery disease and liver related disorders[24,25]
6	*Citrus unshiu*	Rutaceae	β - cryptoxanthin,hesperidin	Peel , juice	Inhibit colon carcinogenesis,used for gastric secretion promotion, sedative effect and inhibition of airway constraction[26,27]
7	*Brasssica oleracea L.*	Cruciferae	Vit-c , glutaminie and indole -3-carbinol	Flowers	Inhibit tumor promotion , anti inflammatory[28]

8	*Beta vulgaris L.*	Chennopodiaceae	Betaine,vit-c	Various parts	Inhibit tumor promotion anti oxidant activity[29,30]
9	*Achyranthes aspera L.*	Amaranthaceae	Saponins,Flavanoids and Phenolic compounds	Leaves	Suppresses carcinogenesis , use in treatment of malarial fever, dysentery, asthma and diabetes[31]
10	*Carthamus tinctorius L.*	Compositae	Phytosterols, stigmasterol	Seeds	Inhibit tumor promotion[32]
11	*Zingiber officinale*	Zingiberaceae	Zingerone, shogaols and gingerol	Rhizomes	Inhibit tumor promotion[33]
12	*Camellia Sinensis L.*	Theaceae	Epigallocatechin gallate(EGCG)	Leaves	Inhibit tumor promotion[34]
13	*Withania Somnifera*	Solanaceae	Polyphenols, alkaloids-isopelletierine, steroidal lactones	Bark,gel	Reduce tumor growth, anti-inflammatory, anti tumor, anti oxidant, anti stress activity[35,36]
14	*Pfaffia paniculata*	Amaranthaceae	Saponins	Roots	Inhibitory action on the growth melanoma, cytotoxic activity[37]
15	*Oroxylum indicum*	Bignoniaceae	Baicalin , chrysin,biacalein	Bark	Inhibnit proliferation of cancer cells ,induce apoptosis, used in treatment of gastric ulcer,tonsil pain,scabies and moth cancer[38,39]
16	*Calotropis procera*	Asclepiadaceae	Cordenolide	Root bark	Inhibit cancer cells, used in treatment of leprosy, ulcers, piles,and tumors[40,41]
17	*Baerahaavia diffusa*	Nyctaginaceae	Rotenoids-boeravinones G&H	Various parts	Used in the treatment of cancer, jaundice, dyspepsia, and inflammation[42]

TABLE -2: OTHER MEDICINAL PLANTS WITH ANTI CANCER ACTIVITY

S.No	Plant Name	Family	Parts used
1	*Andrographis paniculata*	Acanthaceae	Areal Parts[43]
2	*Azadirachta Indica*	Meliaceae	Leaves[44,45]
3	*Calycopteris floriabunda*	Combretaceae	Leaves[46]
4	*Curcuma longa*	Zingiberaceae	Rhizomes[47,48]
5	*Morinda citryfolia L.*	Rubiaceae	Roots and Fruit[49,50]
6	*Mangifera Indica*	Anacardiaceae	Fruits ,Bark and Leaves[51]
7	*Polylthia Longifolia*	Annonaceae	Leaves[52]
8	*Tephrosia Purpurea*	Fabaceae	Roots [53]
9	*Nerium oleander*	Apocynaceae	Leaves and Flowers[54]
10	*Codiaeum variegatum*	Euphorbiaceae	Leaves[55]

TABLE-3: MARINE DERIVED POTENTIAL ANTI CANCER AGENTS

S.No	Organism	Compound	Mechanism of action
1	*Ascidian*	Aplidine	Induction apoptosis with concomitant G_1 arrest and G_2 blockage[56]
2	*Mollusc*	Dolastatin 10	Binds to amino-terminal peptide of β – tubulin containing cysteine[57-59]
3	*Bryozoans*	Bryostatin-1	Potentiation of ara-C induced apoptosis by PKC-dependent release of TNF-α[60-63]
4	*Acidian*	Ecteinascidin-743	Telomere dysfunction increases susceptibility to ET-743[64,65]

DISCUSSION AND CONCLUSION

The selected medicinal plants and marine sources in this review have several pharmacological activities like anti cancer activity, anti oxidant activity, anti filariasis activity, anti inflammatory activity, anti diabetic activity and many more. Several medicinal herbs and their derived substance have been a prime source for the treatment of cancer and many other diseases, many of which are consumed daily with the diet. These medicinal plants possess good immunomodulatory and anti oxidant properties leading to anti cancer activity. The anti oxidant medicinal herbs and their products prevent from the cancer and other diseases by protecting cells from damage. The observation of the tabular form shows that there are several families in the plant kingdom and almost all families have one or more pharmacological activities. This review may helpful to the researches for easy analyzation of medicinal plants and their family, plant derived substances and their pharmacological activities or uses.

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