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Anti Cancer Herbs Used in Siddha System of Medicine: A Review

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ABSTRACT

India is the largest manufacturer of medicinal plants and it is called the "Botanical garden of the World". So that this country having various traditional system of medicines. The Siddha system of medicine is one of the popular systems practiced in India. In this system, many herbals are used to treat different types of cancer. This paper denotes the works have been done on the anticancer herbs which are treating cancer, based on the traditional uses and scientific reports. A number of reports describe that the anticancer activity of medicinal plants is due to the presence of antioxidants in them. In fact, the medicinal plants are easily available and have no toxicity as compared to the modern (allopathic) drugs. Preparation of standardized dose and dosage regimen may play a critical role in the remedy of cancer. The rate with which cancer is progressing, it seems to have an urgent and effective effort for making good health of humans as well as animals. There is a minor road scale to derive the effective anticancer agents from medicinal plants, which need thorough research.

INTRODUCTION:

Cancer is a general term applied of series of malignant diseases that may affect different parts of body. These diseases are characterized by a rapid and uncontrolled formation of abnormal cells, which may mass together to form a growth or tumor or proliferate throughout the body, initiating abnormal growth at other sites. The cancer may also spread to more distant parts of the body through the lymphatic system or bloodstream [1]. Not all tumors are cancerous. There are over 200 different known cancers that afflict humans [2].

Cancer is a major public health burden in both developed and developing countries. The disease occurs due to some molecular changes within the cell. It was estimated that there were 10.9 million new cases, 6.7 million deaths, and 24.6 million persons living with cancer around the world [3]. It becomes the second major cause of death in the human after cardiovascular disease [4]. The major causes of cancer are smoking, dietary imbalances, hormones and chronic infections leading to chronic inflammation [5]. Breast cancer is the most common form of cancer in women worldwide [6]. In men, Colon cancer and Prostate cancer is the most frequently diagnosed cancer among men [7]. Approximately 5-10 percent of cancers are entirely hereditary [8].

Presently various therapies are available for the treatment of cancer such as chemotherapy, radiotherapy, immunomodulation and surgery *etc*. Besides these expensive therapies, phytotherapy plays a significant role for the treatment of cancer. Since medieval times, plants have been the source of medicines for the treatment of diseases [9]. According to Crag and Newman [10] over 50 % of the drugs in clinical trials for anticancer properties were isolated from natural sources or are related to them. The National Cancer Institute collected about 35,000 plant samples from 20 countries and has screened around 114,000 extracts for anticancer activity [11]. Over 3000 species of plants with antitumor properties have been reported [12]. India is the largest manufacturer of medicinal plants and it is called the "Botanical garden of the World". So that this country having various traditional system of medicines. The Siddha system of medicine is one of the popular systems practiced in south India. The various chronic diseases are treating this system of medicine include cancer. This article describes some significant siddha medicinal plants contain Anti-cancer property.

Classification of Cancers [13]:

1) Cancers of Blood and Lymphatic Systems:

a) Hodgkin's disease b) Leukemia's 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.

Symptoms:

Symptoms of cancer depend on the type and location of cancer. For example, lung cancer can cause coughing, shortness of breath, or chest pain. Colon cancer often causes diarrhea, constipation, and blood in the stool. Some cancers may not have any symptoms at all. In certain cancers, such as pancreatic cancer, symptoms often do not start until the disease has reached an advanced stage [14].

The following symptoms can occur with most cancers:

1. Chills

2. Fatigue

3. Fever

4. Loss of appetite

5. Malaise

6. Night sweats

7. Weight loss

Causes:

Cancers are primarily an environmental disease with 90–95% of cases attributed to environmental factors and 5–10% due to genetics. Environmental, as used by cancer researchers, means any cause that is not inherited genetically, not merely pollution. Common environmental factors that contribute to cancer death include tobacco (25–30%), diet and obesity (30–35%), infections (15–20%), radiation (both ionizing and non-ionizing, up to 10%), stress, lack of physical activity, and environmental pollutants [15].

Some important Cancers:

1. Bladder Cancer: Bladder cancer is easily cured if found and treated early. Symptoms of bladder cancer include painful urination and blood in the urine. Causes are unknown. Treatment includes surgery, chemotherapy, and radiation. Bladder cancer is the rapid, uncontrolled growth of abnormal cells in the bladder. Cancer usually begins in the lining of the bladder. The cancerous cells may spread through the lining into the muscular wall of the bladder. Invasive bladder cancer may spread to lymph nodes, other organs in the pelvis (causing problems with kidney and bowel function), or other organs in the body, such as the liver and lungs [16].

2. Brain Cancer: Cancers of the brain are the consequence of abnormal growth of cells in the brain. Brain cancers can arise from primary brain cells, the cells that form other brain components (for example, membranes, blood vessels), or from the growth of cancer cells that develop in other organs and that have spread to the brain by the bloodstream (metastatic brain cancer) [17].

3. Breast Cancer: Breast cancer is cancer that starts in the tissues of the breast. Breast cancer may be invasive or noninvasive. Invasive means it has spread from the milk duct or lobule to other tissues in the breast. Noninvasive means it has not yet invaded other breast tissue. Many breast cancers are sensitive to the hormone estrogen. This means that estrogen causes the breast cancer tumor to grow. Such cancers have estrogen receptors on the surface of their cells. They are called estrogen receptor-positive cancer or ER-positive cancer [18].

4. Cervical Cancer: Cervical cancer is mostly caused by the organism, called human papillomavirus or HPV. An HPV vaccine may reduce the risk of cervical cancer. Symptoms include painful sex, vaginal bleeding, and discharge. Cervical cancer can be prevented. Cervical cancer happens when abnormal cells on the cervix grow out of control. Cervical cancer can often be successfully treated when it's found early. It is usually found at a very early stage through a Pap test. If cervical cancer isn't treated, it may spread from the cervix to the vagina, and then into deeper tissue layers of connective tissue around the uterus. As it progresses, it may spread to the pelvic lymph nodes and other pelvic organs. Advanced-stage cancer may spread to lymph nodes; to other organs in the pelvis, causing problems with kidney and bowel function; or to other organs in the body, such as the liver and lungs [19].

5. Colorectal Cancer: Colorectal cancer, commonly known as colon cancer or bowel cancer, it starts from uncontrolled cell growth in the colon or rectum (parts of the large intestine), or in the appendix. Genetic analysis shows that colon and rectal tumors are genetically same. Symptoms of colorectal cancer typically include rectal bleeding and anemia which are sometimes associated with weight loss and changes in bowel habits [20].

6. Ovarian Cancer: Ovarian cancer occurs when a cancerous tumor is in a woman's ovary. In most cases, there are no known causes. There are often no symptoms, but ovarian cancer warning signs include ongoing pain or cramps in the belly or back, abnormal vaginal bleeding, and nausea and bloating [21].

7. Non-Hodgkin's Lymphoma: Non-Hodgkin's lymphoma is cancer of the lymph nodes. The cause is unknown; it may be triggered by infections or a compromised immune system. Symptoms include fever, night sweats, swollen glands, fatigue, and weight loss. Non-Hodgkin's lymphoma (NHL) is cancer of the lymphatic system, which is part of the immune system. The lymphatic system is found throughout the body. When you have this disease,

cells in the lymphatic system either grow without control or do not die as cells normally do [22].

8. Lungs cancer: Lung cancer is cancer that starts in the lungs. The lungs are located in the chest. When you breathe, air goes through your nose, down your windpipe (trachea), and into the lungs, where it spreads through tubes called bronchi. Most lung cancer begins in the cells that line these tubes [23].

9. Prostate cancer: Prostate cancer is cancer that starts in the prostate gland. The prostate is a small, walnut-sized structure that makes up part of a man's reproductive system. It wraps around the urethra, the tube that carries urine out of the body [24].

10. **Pancreatic cancer**: Pancreatic cancer occurs when this uncontrolled cell growth begins in the pancreas. Rather than developing into healthy, normal pancreas tissue, these abnormal cells continue dividing and form lumps or masses of tissue called tumors. Tumors then interfere with the main functions of the pancreas. If a tumor stays in one spot and demonstrates limited growth, it is generally considered to be benign [25].

11. Skin cancer: Skin cancer is the most common form of human cancer. It is estimated that over 1 million new cases occur annually. The annual rates of all forms of skin cancer are increasing each year, representing a growing public concern. It has also been estimated that nearly half of all Americans who live to age 65 will develop skin cancer at least once. The most common warning sign of skin cancer is a change in the appearance of the skin, such as a new growth or a sore that will not heal [26].

12. Thyroid cancer: The next most common type of cancer of the thyroid is called medullary thyroid cancer (5%), which is derived from the parafollicular "C" cells of the thyroid. In about 15% of patients with this cancer, there is a familial genetic predisposition to develop other types of endocrine tumors. Medullary thyroid cancer is more aggressive than papillary or follicular cancer and is more likely to spread to lymph nodes and outside of the neck. The other major type of thyroid cancer often described is called anaplastic thyroid cancer (1%). This cancer usually affects older people and is very aggressive. Other rare types of cancers that may be found in the thyroid include lymphomas (cancer of the lymph gland cells), or metastasis (cancers from other sites that have spread to the thyroid gland, such as melanoma, breast cancer, renal cell cancer, or lung cancer) [27].

13. Penile cancer: Penile cancer is a rare disease in which cancer cells develop within the skin and/or soft tissues of the penis. Penile cancer commonly presents as a lump, mass or ulcer on the penis. Lesions can be raised and wart-like or flat. The penile lesion can be sore and inflamed, and there may be itching and burning in the region as well. Generally, penile cancers affect the head or foreskin of the penis rather than the shaft of the penis. Although some penile cancers begin as pre-malignant lesions, the majority of penile cancers do not have premalignant lesions. The presentation for penile cancers can vary significantly from a small bump to very large, infected, and aggressive lesions [28].

14. Testicular cancer: Testicular cancer begins when cells within the testicle become cancerous and begin to grow out of control. Ninety-five percent of testicular tumors are a type called germ cell tumors [29].

15. Bone cancer: A bone tumor is an abnormal growth of cells within a bone. A bone tumor may be cancerous (malignant) or noncancerous (benign). Cancers that start in the bones are referred to as primary bone tumors. Cancers that start in another part of the body (such as the breast, lungs, or colon) are called secondary or metastatic bone tumors. They behave very differently from primary bone tumors. Multiple myeloma often affects or involves the bone, but is not considered a primary bone tumor [30].

16. **Carcinoid cancer**: Carcinoid tumors are a type of slow-growing cancer that can arise in several places throughout your body. Carcinoid tumors, which are one subset of tumors called neuroendocrine tumors, usually begin in the digestive tract (stomach, appendix, small intestine, colon, and rectum) or in the lungs. Carcinoid tumors often don't cause signs and symptoms until late in the disease. Carcinoid tumors can produce and release hormones into your body that cause signs and symptoms such as diarrhea or skin flushing. Treatment for carcinoid tumors usually includes surgery and may include medications [31].

17. **Endocrine cancer**: An endocrine tumor is a growth that affects the part of the body that secretes hormones. Because an endocrine tumor starts in the cells that make hormones, the tumor itself can make hormones and cause serious illness. Endocrine cancer is cancer that begins in one of these glands. The most common sort of endocrine cancer is thyroid cancer, which begins in the thyroid gland. There are also some types of pancreatic cancer (cancer in the pancreas) that are classified as endocrine tumors. Some tumors that grow in an endocrine gland are benign, which means they're not cancerous.

For example, most pituitary tumors are benign. However, benign tumors are often treated in the same way as cancerous tumors [32].

18. Gastrointestinal cancer: The gastrointestinal tract runs from the mouth to the anus, and includes the oesophagus (gullet), stomach, small bowel or intestine, and the large bowel (colon and rectum). Cancer can affect any part of the gastrointestinal tract, although, curiously, it is rare in the small intestine where most digestion takes place. An indolent (slow-growing) cancer that forms in cells that make hormones in the lining of the gastrointestinal tract (the stomach and intestines). It usually occurs in the appendix (a small fingerlike pouch of the large intestine), small intestine, or rectum. Having gastrointestinal carcinoid tumor increases the risk of forming other cancers of the digestive system [33].

19. Head and neck cancer: Cancers that are known collectively as head and neck cancers usually begin in the squamous cells that line the moist, mucosal surfaces inside the head and neck (for example, inside the mouth, the nose, and the throat). These squamous cell cancers are often referred to as squamous cell carcinomas of the head and neck. Head and neck cancers can also begin in the salivary glands, but salivary gland cancers are relatively uncommon. Salivary glands contain many different types of cells that can become cancerous, so there are many different types of salivary gland cancer [34].

20. **Oral cancer**: Oral cancer is a subtype of head and neck cancer is any cancerous tissue growth located in the oral cavity. It may arise as a primary lesion originating in any of the oral tissues, by metastasis from a distant site of origin, or by extension from a neighboring anatomic structure, such as the nasal cavity. Alternatively, the Oral cancers may originate in any of the tissues of the mouth and may be of varied histological types: teratoma, adenocarcinoma derived from a major or minor salivary gland, lymphoma from tonsillar or other lymphoid tissue, or melanoma from the pigment-producing cells of the oral mucosa. There are several types of oral cancers, but around 90% are squamous cell carcinomas, originating in the tissues that line the mouth and lips.

Oral or mouth cancer most commonly involves the tongue. It may also occur on the floor of the mouth, cheek lining, gingiva (gums), lips, or palate (roof of the mouth). Most oral cancers look very similar under the microscope and are called squamous cell carcinoma [35].

21. Leukemia: Leukemia is a type of cancer of the blood or bone marrow characterized by an abnormal increase of immature white blood cells called "blasts." Leukemia is a broad term

covering a spectrum of diseases. In turn, it is part of the even broader group of diseases affecting the blood, bone marrow, and lymphoid system, which are all known as hematological neoplasm. In 2000, approximately 256,000 children and adults around the world developed some form of leukemia, and 209,000 died from it. Younger patients tend to live longer, as older patients aren't expected to live quite as long. About 90% of all leukemia's are diagnosed in adult [36].

22. Lymphoma: Lymphoma is a type of blood cancer that occurs when lymphocytes, white blood cells that form a part of the immune system and help protect the body from infection and disease, begin behaving abnormally. Abnormal lymphocytes may divide faster than normal cells or they may live longer than they are supposed to. Lymphoma may develop in many parts of the body, including the lymph nodes, spleen, bone marrow, blood or other organs [37].

Prevention:

1. Eating a healthy diet

2. Exercising regularly

3. Limiting alcohol

4. Maintaining a healthy weight

5. Minimizing your exposure to radiation and toxic chemicals

6. Not smoking or chewing tobacco

7. Reducing sun exposure, especially if you burn easily

Cancer screenings, such as mammography and breast examination for breast cancer and colonoscopy for colon cancer, may help catch these cancers at their early stages when they are most treatable. Some people at high risk for developing certain cancers can take medication to reduce their risk [38].

TABLE NO. 1: SOME ANTI-CANCER SIDDHA MEDICINAL PLANTS

S. No	Botanical name	Family	Common name [Siddha]	Active constituent	Type of the tested cancer cells and Method
1.	*Allium sativum*	Liliaceae	Garlic	Alliin, allicin, alliin, alliinase, S-allylcysteine (SAC), diallyldisulphide (DADS), diallyltrisulphide (DATS) and Methylallyltrisuphide	Oral cancer cell, sarcoma 180 cancer cell / *In vivo*
2.	*Andrograpis paniculata*	Acanthaceae	Nila vembu	Andrographolide	Lymphocytic, prostate, hepatoma, colon cancer cell lines/ *In vitro* / MTT test
3.	*Curcuma longa* Linn	Zinziberaceaee	Manjal	Tumerone, curcumine	Colon Cancer Cells / *In vitro* / Lactate
4.	*Jatropha curcus*	Euphorbiaceae	Kattu aamanaku	Curcin	Skin cancer / *In vivo*
5.	*Rubia cardifolia*	Rutaeaceae	Manjishti	Rutin	Coloncarcinoma, breast carcinoma and liver carcinoma / *In vitro* / MTT test
6.	*Semecarpus anacardium*	Anacariaceae	Seran kottai	Anacardicacid, ana cardol, semicarpal, catechol, bhilawanol	Acute myeloblastic leukemia, myelogenic leukemia, breast adenocarcinoma, cervical epithelial carcinoma and colon carcinoma cancer cell lines / *In vitro* / MTT test
7.	*Withania somnifera*	Solanaceae	Ashwagandha	Withanolides, Withaferin	Sarcoma 180 cancer / *In Vivo*

8.	*Zingiber officinale*	Zingiberaceae	Ginger	Curcumin, gingerenone A,Gingeols, shogaols, zingerone	Prostate cancer cellline / *In vitro* and *In vivo* / MTT test
9.	*Bacopa monniera* L	Scropulariaceae	Nir brahmi	Brahmine	Mouse sarcoma Cell line/ *In vitro* / Trypan blue exclusion test
10.	*Ocimum gratissimum* L	Lamiaceae	Elumichai thulasi	Thymol, eugenol, methyl chavicol	Breast cancer / *In vivo* and *In vitro* / MTT test

1. ANDROTROPIS PANICULATA:

Phytochemical investigation of the ethanol extract of the aerial parts of this herb resulted in the isolation of 14 compounds including flavonoids and lactone diterpenoids. This is the first isolation of compound 6 from a natural source, and the aerial parts of *A. paniculata* are a rich source for the molecule andrographolide (9, 1.375%, w/w). Andrographolide inhibits castration-resistant C4-2 cell growth by reducing AR expression and activity. Thus, andrographolide can be developed as a potential therapeutic agent for prostate cancer by inhibition of androgen receptor signaling [39].

2. *ALLIUM SATIVUM:*

A number of studies have demonstrated the chemopreventive activity of garlic by using different garlic preparations including fresh garlic extract, aged garlic, garlic oil and a number of organosulfur compounds derived from garlic. The chemopreventive activity has been attributed to the presence of organosulfur compounds in garlic. The exact mode of action was not fully understood, but several modes of action have been proposed. These include its effect on drug metabolizing enzymes, antioxidant properties and tumor growth inhibition [40, 41, 42].

3. *CURCUMA LONGA*

Curcumin has been detected to exist in nature in the form of curcuminoids, a mixture of curcumin, the major component, with two of its related demethoxy compounds (demethoxycurcumin and bisdemethoxycurcumin). Results showed that curcuminoids inhibited cell proliferation and induced apoptosis of these human primary colon cancer cells.

The effects were observed in a dose-dependent manner as dose increased from 12.5 to 100 µM.

Demethoxycurcumin (DMC; a curcumin-related demethoxy compound) has been recently shown to display antioxidant and anticancer activities. It has also produced a potent chemopreventive action against cancer. The anti-proliferation (using the MTT assay, DMC were found to have cytotoxic activities against GBM 8401 cell with IC50 values at 22.71 M) and induced apoptosis effects of DMC in human brain malignant glioma GBM 8401 cells [43].

4. *JATROPHA CURCAS:*

Based on the results of spectroscopic analyses of the compound and its chemical degradation products, its structure is proposed to be an intramolecular 13,16-diester of 12-deoxy-16-hydroxyphorbol,l2-dcoxy-16-hydroxyphorbol-4'-|12',14'-butadienyl|-6'-|'6M8',20' nonatrienyl|-bicyclo|3.1.0|hexane-(13-O)-2 '-|carboxylate|-(16-0)-3'-|8 '- butenoic-10']atf (DIIPB). 1)1Il'li showed slightly weaker biological and biochemical activities than 12-0-tetradecanoylphorbol-13-acetate (TPA). DIIPB induced ornithine decarboxylase in mouse skin (2.8 nmol CO_2 30 min/mg protein/34 nmol application), inhibited the specific binding of I'll-lI-O-tetradecanoNlphorbol-IV acetate to phorbol ester receptors (50% effective dose, 17.0 UM), and activated protein kinase C *in vitro* (50% effective dose, 36.0 nM). Also, a weak tumor-promoting activity of DIIPB was found in a two-stage carcinogenesis experiment on mouse skin. One week after initiation of mice with 100 Mg of 7,12-dimethylbenzyl anthracene, topical application, twice a week, of 2 /g of DIIPB until week 17, followed by application of 5 *ig of DHPB until week 30 at the same rate, resulted in 46.7% incidence of tumors by week 30. The groups treated with 7,12-dimethylbenz(a)anthracene alone or DHPB alone did not produce significant numbers of tumors. These results indicate that the new phorbol ester, DHPB, is a tumor promoter with weaker activity than 12-0-tetradecanoylphorbol-13-acetate [44, 45].

5. *RUBIA CARDIFOLIA*:

Activity-directed isolation of the methylene chloride fraction of the roots of *Rubia cordifolia* L. resulted in the identification of a new epoxymollugin (3) and eight known compounds (1, 2, 4-9). The structures of the compounds were elucidated from chemical and spectroscopic

evidence. In addition, their topoisomerase I and II inhibitory activities and cytotoxicities were measured [46].

6. *SEMECARPUS ANACARDIUM*:

The fruits and seeds of *Semecarpus anacardium* are used widely for the treatment of human cancers and other diseases in the Ayurvedic and Siddha systems of medicine in India. Anticancer activity predominantly present in the catechol compound from *Semecarpus anacardium* [47].

7. *WITHANIA SOMNIFERA*:

Withaferin A and withanolide D found in *Withania somnifera* are known to inhibit growth of cancer. The other alkaloids presents in *Withania somnifera* are ashwagandhine, cuscohygrine, anahygrine, tropine, steroidal compounds, including ergostane type steroidal lactones, withasomniferin-A, withasomidienone, withasomniferols A-C, and withanone. Other constituents include saponins containing an additional acyl group (sitoindoside VII and VIII), and withanolides with a glucose at carbon 27 (sitoindoside IX and X). Apart from these contents plant also contain chemical constituents like withaniol, acylsteryl glucosides, starch, reducing sugar, hantreacotane and ducitol. Studies have revealed that *Withania somnifera* enhances the therapeutic effect of radiotherapy. The chemopreventive activity is thought to be due in part to the antioxidant / free radical scavenging activity of the extract. An *in vitro* study showed withanolides from *Withania somnifera* inhibited growth in human breast, central nervous system, lung, and colon cancer cell lines comparable to doxorubicin [48, 49].

8. *ZINGIBER OFFICINALE*:

Ginger (*Zingiber officinale*, Zingiberaceae) has been widely used as a dietary spice, and as a traditional oriental medicine. The rhizome of ginger contains pungent vanillyl ketones, including [6]-gingerol and [6]-paradol, and have been credited with therapeutic and preventive health benefits, including anti-cancer activity. Prostate cancer is an attractive target for chemoprevention because of its ubiquity, treatment-related morbidity, long latency between premalignant lesions and clinically evident cancer, and defined molecular pathogenesis [50].

9. *BACOPA MONNIERA*:

Antioxidative property and tumor inhibitive property of *B. monniera* (20mg/kg body wt, sc) was examined in 3-methylcholanthrene induced fibrosarcoma rats. Antioxidant enzymes such as catalase (CAT), superoxide dismutase (SOD), glutathione peroxidase (GPx) and the levels of glutathione (GSH) and the rate of lipid peroxidation (LPO) in the liver and kidney tissues were assessed. A significant increase was noted for the rate of LPO with a corresponding decrease in the antioxidant enzyme status in fibrosarcoma bearing rats. In fibrosarcoma bearing rats, the tumor markers like lactate dehydrogenase (LDH), creatine kinase (CK), alanine transaminase (ALT), aspartate transaminase (AST) and sialic acid (SA) were increased in the serum. Treatment with *B. monniera* extract significantly increased the antioxidant enzyme status, inhibited lipid peroxidation and reduced the tumor markers. It can be concluded that *B.monniera* extract promotes the antioxidant status, reduces the rate of lipid peroxidation and the markers of tumor progression in the fibro sarcoma bearing rats [51].

10. *OCIMUM GRATISSIMUM*:

Cytotoxic study was carried out on oleanic acid isolated from leaves of ethanolic extract of *O. gratissimum*. Effective dose of the compound at 50% concentration (ED50) to be tested against a panel of six human solid tumor cell lines viz. human lung carcinoma (ED50 3.16 µg/ml), human breast carcinoma (ED50 2.46 µg/ml), human colon adenocarcinoma.(ED50 3.12 µg/ml) human renal carcinoma.(ED50 3.13 µg/ml), human prostate adenocarcinoma (ED50 2.58 µg/ml) human pancreatic carcinoma (ED50 3.47 µg/ml), and yellow fever mosquito larvae *Aedes aegypti*.(LC50 4.4 µg/ml) [52]

CONCLUSION

Siddha system of medicine has rich collection of herbs for the treatment of various acute and chronic ailments. Cancer stands as one of the leading health problem worldwide especially in developing countries like India. In this review, some anticancer Siddha medicinal plants of Indian origin have been presented. These medicinal plants possess good antioxidant properties, leading to anticancer activities. More efforts are needed to explore potent anticancer plants from the mother soil and save humans around the world from cancer.

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