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A Review on a few medicinal plants possessing anticancer activity against human breast cancer

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Abstract: Breast Cancer is known to be the second most common cause of death. So there has been intense research on various plant resources to develop novel anticancer agents against breast cancer.Herbal medicine is one of the most commonly used complementary and alternative therapies (CAM) by people with cancer. Some studies have shown that as many as 6 out of every 10 people with cancer (60%) use herbal remedies alongside conventional cancer treatments. There are many different types of herbal medicines and some of them overlap with foods. Commonly used plants include Echinacea, St John's Wort, green tea and ginger. From the past several years, medicinal plants have been proved to be an important natural source for cancer therapy with fewer side effects. There are many natural cytotoxic drugs available, which needs further improvement and development of new drugs. An attempt has been made to review some medicinal plants used for the prevention and treatment of cancer. This article considers a few medicinal plants used anticancer activity against breast cancer cell line(MCF-7). It will be helpful to explore the medicinal value of plants and for new drug discovery from them for the researchers and scientists around the globe.
Keywords: Medicinal plants, Anticancer, MTT assay, MCF-7 cells.

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 through out the body, initiating abnormal growth at other sites. If the process is not arrested, it may progress until it causes the death of the organism. The main forms of treatment for cancer in humans are surgery, radiation and drugs (cancer chemotherapeutic agents). Cancer chemotherapeutic agents can often provide temporary relief of symptoms, prolongation of life, and occasionally cures. In recent years, a lot of effort has been applied to the synthesis of potential anticancer drugs. Many hundreds of chemical variants of known class of cancer chemotherapeutic agents have been synthesized but have a more side effects. A successful anticancer drug should kill or incapacitate cancer cells without causing excessive damage to normal cells. This ideal is difficult, or perhaps impossible, to attain and is why cancer patients frequently suffer unpleasant side effects when under-going treatment. Synthesis of modifications of known drug continues as an important aspect of research. However, a waste amount of synthetic work has given relatively small improvements over the prototype drugs. There is a continued need for new prototype-new templates to use in the design of potential chemotherapeutic agents: natural products are providing such templates. Recent studies of tumor-inhibiting compound of plant origin have yielded an impressive array of novel structures. Many of these structures are extremely complex, and it is most unlikely that such compounds would have been synthesized in empirical approaches to new drugs(2). Modern medicine attributes most cases of cancer to changes in DNA that reduce or eliminate the normal controls over cellular growth, maturation, and

programmed cell death. These changes are more likely to occur in people with certain genetic backgrounds (as illustrated by the finding of genes associated with some cases of cancer and familial prevalence of certain cancers) and in persons infected by chronic viruses (e.g., viral hepatitis may lead to liver cancer; HIV may lead to lymphoma). The ultimate cause, regardless of genetic propensity or viruses that may influence the risk of the cancer, is often exposure to carcinogenic chemicals (including those found in nature) and/or to radiation (including natural cosmic and earthly radiation), coupled with a failure of the immune system to eliminate the cancer cells at an early stage in their multiplication. The immunological weakness might arise years after the exposure to chemicals or radiation. Other factors such as tobacco smoking, alcohol consumption, excess use of caffeine and other drugs, sunshine, infections from such oncogenic virus like cervical papillomaviruses, adenoviruses Karposis sarcoma (HSV) or exposure to asbestos. These obviously are implicated as causal agents of mammalian cancers. However a large population of people is often exposed to these agents. Consequently cancer cells continue to divide even in situations in which normal cells will usually wait for a special chemical transduction signal. The tumor cells would ignore such stop signals that are sent out by adjacent tissues. A Cancer cell also has the character of immortality even in vitro whereas normal cells stop dividing after 50-70 generations and undergoes a programmed cell death (Apoptosis). Cancer cells continue to grow invading nearby tissues and metastasizing to distant parts of the body. Metastasis is the most lethal aspect of carcinogenesis(3).The American Cancer Society estimates that each year over 178,000 American women and 2,000 American men will be diagnosed with breast cancer. Breast cancer is the leading cause of death among women between 40 and 55 years of age and is the second overall cause of death among women (exceeded only by lung cancer). Fortunately, the mortality rate from breast cancer has decreased in recent years with an increased emphasis on early detection and more effective treatments.[6]Several commonly used herbs have been identified by the National Cancer Institute as possessing cancer-preventive properties. Those include members of the Allium sp. [garlic, onions and chives]; members of the Labiatae family [basil, mints, oregano, rosemary, sage, and thyme]; members of the Zingiberaceae family [turmeric and ginger]; members of the Umbelliferae family (anise, caraway, celery, chervil, cilantro, coriander, cumin, dill, fennel, and parsley) (Chan et al., 2004). In addition, many herbs contain a variety of phytosterols, triterpenes, flavonoids, saponins, and carotenoids, which have been shown from studies of legumes, fruit, and vegetables to be cancer chemoprotective (Nishimura et al., 1993). Hence, the present study aims to investigate the therapeutic properties of a library of the selected medicinal plants for their potential anticancer activity against human breast cancer cell lines viz. MCF-7.

Few medicinal plants with anticancer activity

Acorus calamus

A.calamus ayurvedic medicine is documented for treatment of insomnia, neurosis, and remittent fevers. Extractives of different parts of *Acorus calamus* and calamus oil are widely used now in pharmaceuticals, traditional systems of medicines for a number of ailments *Acorus calamus* decreased cell viability in malignant cells in a concentration dependent manner. The IC50 values in MCF-7 cells were determined as 52.07 g/ml. It may be concluded that *Acorus calamus* can cause cell death in MCF-7 cancer cells which can be considered as a promising chemotherapeutic agent in breast cancer treatment (7).

Fig.1: Acorus calamus

Artocarpus heterophyllus

A. heterophyllus in human health such as pulp and seed for tonic; root for diarheae, fever; wood for muscular contraction; leaves for activating milk in women and animal, anti-syphilis, vermifuge, leaf ash for ulcers and wound .The IC50 values of methanolic extract of Artocarpus heterophyllus were found 35.26 µgm/ml and 35.27 µgm/ml against A549 cell line by MTT and SRB assay methods respectively whereas this extract was found to be non- toxic to normal cells (HEK293), proved that the methanolic extract exhibited significant anti- cancer potential with no toxicity on normal cell line. The methanolic extract had no activity against Hela and MCF-7 cell line (8)

Fig:2. Artocarpus heterophyllus

Cynodondactylon

C.dactylon Pers. belongs to the family of Poaceae and is said to have many medicinal properties including Antihelmentic , Antidiuretic, petroleum eather Antiinflammatory, Hepatoprotective activity as well as treatment of Urinary tract infections , Prostatitis, and Dysentery. Traditionally it is used in diabetes jaundice, kidney problems , urinary disease, gastro intestinal disorder, Constipation and abdominal pain. The whole plant is used for diuretic, dropsy, syphilis, wound infection and piles. *C.dactylon* is used as antihemorrhagic in dysentery and nasal bleeding . The juice of the plant is astringent and is applied externally to fresh cuts and wounds. It is used in the treatment of catarrhal ophthalmia, hysteria, epilepsy, insanity, and chronic diarrhea.The IC50 values of effective concentration of petroleum ether extract of *C. dactylon* was non-toxic to Vero cells but toxic to HEP-2, HELA and MCF-7 cells (Ic50) was recorded at a concentration of 0.156 mg/ml 0.625 mg/ml of petroleum ether extract of *C.dactylon*. Among these three cell lines *C.dactylon* shows more activity in HEP-2 laryngeal cell line(9).

Fig:3. Cynodondactylon

Datura metal

D.metel which is from solanaceae family. The species has common names such as thorn apple and downy datura. In Tamil, it is commonly called as Oomatthai, Karuvoomatthai. The plant species is rich in various kinds of alkaloids, such as hyoscine, fastusine, hyoscyamine, littorine, valtropine and acetoxytropine. It also has many withonilides with anticancer properties [and calystigines with glycosidase inhibitory property .The IC50 values of methonolic extract of datura metal leaf was recorded at a concentration of 1000 µg/ml. the leaf extract of *D. metel* has pronounced anticancer potential against MCF-7 cell lines while compared to that of the stem extract.(10)

Fig:4. *Datura metal*

Elaeis guineensis

E.guineensis is a species of palm commonly called African oil palm or macaw-fat. It is the principal source of palm oil. It is native to west and southwest Africa, specifically the area between Angola and the Gambia; the species name *guineensis* refers to the name for the area, Guinea, and not the modern country which now bears that name. The species is also now naturalised in Madagascar, Sri Lanka, Malaysia, Sumatra, Central America, the West Indies and several islands in the Indian and Pacific Oceans. The closely related American oil palm *Elaeis oleifera* and a more distantly related palm, *Attalea maripa*, are also used to produce palm oil.The methanol extract of *E. guineensis* exhibited significant activity against the MCF-7 cell line with an IC50 value of 15.00 µg/ml(11)

Fig:5. Elaeis guineensis

Piper cubeba

P. cubeba L., or tailed pepper, is a plant in the family Piperaceae, genus Piper. This plant is a folkloric plant and has been used as a spice in many countries, including Indonesia, India, Europe (in the Middle Ages) and Morocco. The fruit has also been used for the treatment of dysentery, syphilis, gonorrhea, abdominal pain, diarrhea, enteritis and asthma . P. cubeba has been used in Unani medicine as a protective and curative agent in various renal diseases.The *p.cubeba* seeds methonolic Fraction CE demonstrated the highest activity against MCF-7 cells with an IC50 value of 2.69 ± 0.09 µg/mL. (12)

Fig:6. Piper cubeba

Piper nigrum

Black pepper (*Piper nigrum*) is a flowering vine in the family *Piperaceae,* cultivated for its fruit, which is usually dried and used as a spice and seasoning. When dried, the fruit is known as a peppercorn. When fresh and fully mature, it is approximately 5 millimetres (0.20 in) in diameter, dark red, and, like all drupes, contains a single seed. the crude extract of *P. nigrum* was then separated by column chromatography, fraction D showed activity against both MCF-7 and MDA-MB-468 cells. Fraction DE that was isolated from D demonstrated a highly cytotoxic effect with IC50 values of 8.33 ± 1.27 and 7.48 ± 0.57 µg/ml on MCF-7 and MDA-MB-468 cells.(13).

Fig:7. Piper nigrum

Phyllanthus emblica

P.Emblica is a natural plant used in folk medicine to treat a variety of ailments and for a number of applications. All parts of the plant are used in the herbal preparations, includ- ing the fruit, seed, leaves, root, bark and flowers, cholorophylin extracted from phyl- lanthus emblica shows best result in the concentration of 150µg. Hence it showed the presence of anticancer activity against breast cancer cell line.(14)

Fig:8. Phyllanthus emblica

Prosopis cineraria

The wood of *P. cineraria* is a good fuel source, and provides excellent charcoal plus firewood, fodder, green manure and goat-proof thorny fences. The leaves, called "Loong" in India and pods are consumed by livestock and are a beneficial forage. In Rajasthan, India, *P. cineraria* is grown in an agroforestry setting in conjunction with millet. The tree is well-suited for an agroforestry setting, because it has a single-layered canopy, it is a nitrogen fixer (thus enriching the soil), and its deep roots avoid competition for water with crops. This study showed that *P.cineraria* leaves inhibit the proliferation of MCF-7 breast cancer cells with the involvement of apoptosis or programmed cell death. *P.cineraria* could also be considered as a promising chemotherapeutic agent in cancer treatment.(15).

Fig:9. Prosopis cineraria

Solanum anguivi

S.anguivi is a non tuberous and widely distributed plant possesses various medicinal properties. Mostly, the plant prefers to grow in humid temperature and commonly found as weed in gardens. The dried powders of the fruits were used in the medication for Blood pressureThe ethyl acetate extract of the Solanum anguivi was analyzed for its antiproliferative activity against the cell lines using MTT assay at various concentrations. The cell viability was reduced upto 50% at the concentration of 0.625 mg/ml for HEp G2 cell line and 1.25 mg/ml MCF-7 cell line.(16).

Fig:10. Solanum anguivi

Tecomastans (voucher Reg.no of PARC/2012/1141.)

Tecomastans (L.) belongs to the family *Bignoniaceae* are distributed worldwide, mostly occur in tropical and sub tropical countries. .Traditional use of leaves of T.stans in throughout Mexico and central America for diabetes and urinary disorder control. Roots are used as diuretic and vermifuge. Traditionally flowers and bark are used for treatment of various cancers. The stem barks showed better antimicrobial activity. Its Leafs shows Anthelmintic Activity, Antispasmodic effect. *Tecomastans*leaf extract showed a significant antiproliferative activity and a dose dependent effect was observed. Minimum inhibition of 14.6 % was shown by extract at concentration 7.8 µg/ml and maximum inhibition (95.9%) was observed at 1000 µg/ml. The plant extract showed activity in potential range for further investigation on cancer cells.(17).

Fig:11. Tecomastans

Vernonia amygodalina

V.amygdalina (VA) is a woody shrub that can grow up to 5 m tall, belonging to the family of *Asteraceae*. Native to Nigeria (West Africa) and widely grown in Africa , VA is also found in Asia, and is especially common in Singapore and Malaysia .VA has been shown to possess diverse therapeutic effects such as anti-malarial, anti-microbial (anti-bacterial, anti-fungal, anti-plasmodial, etc.) the IC50 values for MCF-7 cells 56 mg/ml at 24, 48 and 72 h respectively kill the MCF-7 cell lines of veronica amygodalina leaves in 10% DMSO extract.(18).

Fig:12.Vernonia amygodalina

Vetiveria zizanioides

V. zizanioides (Nash), belonging to the family *Poaceae*. Commonly known as Khash-Khas, Khas or khus grass in India. Historically Vetiver grass was well known in tropical countries for its aromatic and medicinal properties. It is a perennial grass with thick fibrous adventitious roots which are aromatic and highly valued. India is inhabited by a wide variety of tribal populations who dwell in forested areas and depend on surrounding resources for their livelihood.The aqueous extract of root exhibited cytotoxicity towards the cancer cell line. IC50 concentration of 5µg/ml to 50µg/ml against human breast adenocarcinoma MCF-7 cell line was recorded. The maximum inhibition of concentration showed in 31µg/ml to 37µg/ml.(19).

Fig:13. Vetiveria zizanioides

Artocarpus heterophyllus

The jackfruit (*Artocarpus heterophyllus*), also known as jack tree, jakfruit, or sometimes simply jack or jak is a species of tree in the mulberry and fig family (Moraceae).It is native to parts of South and Southeast Asia, and is believed to have originated in the southwestern rain forests of India, in present-day Goa, Kerala, Tamil Nadu, coastal Karnataka, and Maharashtra. The jackfruit tree is well suited to tropical lowlands, and its fruit is the largest tree-borne fruit, reaching as much as 35 kg (80 lb) in weight, 90 cm (35 in) in length, and 50 cm (20 in) in diameter.*A. heterophyllus* bark extract 90% ethyl acetate alcohol exhibited cytotoxicity towards the cancer cell line. IC50 concentration of 35.05+/- 0.72µg/ml against human breast adenocarcinoma MCF-7 cell line was recorded.(20).

Fig:14. Artocarpus heterophyllus

Sesbania grandiflora

Leaves used as tonic, diuretic, laxative, antipyretic, chewed to disinfect mouth and throat. *Flower* in headache, dimness of vision, Catarrh, Headache, cooling and improving appetite, bitter, astringent, acrid, antipyretic. *Bark* is used for cooling (ayurvedha and siddha medicinal terms), bitter tonic, anthelmintic, febrifuge, diarrhea, Small pox, Astringent. *Fruits* in Bitter and acrid, laxative, fever, pain, bronchitis, anemia, tumors, colic, jaundice, poisoning. *Root* used in Rheumatism, Expectorant, Painful swelling, Catarrh. *S. grandiflora* bark extract 90% ethyl acetate alcohol exhibited cytotoxicity towards the cancer cell line. IC50 concentration of 7.00+/-0.08µg/ml against human breast adenocarcinoma MCF-7 cell line was recorded.(21).

Fig:15. Sesbania grandiflora

Wrightia tinctoria

W. tinctoria, Pala indigo plant or dyers's oleander, is a flowering plant species in the genus *Wrightia* found in India.The plant contains wrightial, a triterpenoid chemical, along with cycloartenone, cycloeucalenol, β-amyrin, and β-sitosterol isolated from the methanol extract of the immature seed pods.It is a medicinal plant in Ayurveda. One of its botanical synonyms Holarrhena antidysenterica says it all. It is one of the best drug for Diarrhoea. In chronic diarrhoea & to check blood coming from stool,it should be given with Isobgol, caster oil or Indrayav. According to Ayurveda, the bark is useful in treatment of piles, skin diseases and biliousness. The bark is used externally in case of skin troubles. The bark is mostly mixed with cow urine and apply it in affected parts. In treatment of urinary troubles, the bark is given with cow milk. The fresh juice of bark is considered good to check the diarrhoea. In Bleeding piles Decoction of Kutaj bark with sunthi checks mucus & blood. Application of this herb is useful in Rh. Arthritis & Oestioarthritis.W. tinctoria bark extract 90% ethyl acetate alcohol exhibited cytotoxicity towards the cancer cell line. IC50 concentration of 10.00+-0.05µg/ml against human breast adenocarcinoma MCF-7 cell line was recorded.(22).

Fig:16. Wrightia tinctoria

Inula graveolens

Inula is a large genus of about 90 species of flowering plants in the family*Asteraceae*, native to Europe, Asia and Africa.They may be annuals, herbaceousperennials or subshrubs that vary greatly in size, from small species a few centimeters tall to enormous perennials over 3 m (10 ft) tall. They carry yellow daisy-like composite flowerheads often with narrow ray-florets.*I.graveolens* plant extract chloroform/ethonolic exhibited antiproliferative activity against breast cancer cell line The most active plant was *I. graveolens* with an IC50 of 3.83 µg/ml(23).

Fig:17. *Inula graveolens*

Tephrosia purpurea

T.purpurea is a species of flowering plant in the pea family, *Fabaceae*, that has a pantropical distribution. It is a common wasteland weed. In many parts it is under cultivation as green manure crop. It is found throughout India and Sri Lanka[1] in poor soils. the plant is anthelmintic, alexiteric, restorative, and antipyretic; it is used in the treatment of leprosy, ulcers, asthma, and tumors, as well as diseases of the liver, spleen, heart, and blood. A decoction of the roots is given in dyspepsia, diarrhea, rheumatism, asthma and urinary disorders. *T.purpurea* leaves alcoholic fraction showed that among all these fractions of TPI, TPIII, The IC50 value for TPI (152.4 µ M), TPIII (158.71µ M). against human breast cancer cell line(MCF-7)(24).

Fig:18. *Tephrosia purpurea*

Ficus religiosa

F. religiosa or sacred fig is a species of fig native to Nepal, India, Bangladesh, Myanmar, Pakistan, Sri Lanka, south-west China and Indochina. It belongs to the *Moraceae*, the fig or mulberry family. It is also known as the bodhi tree, pippala tree, peepal tree or ashwattha tree *F. religiosa* is used in traditional medicine for about 50 types of disorders including asthma, diabetes, diarrhea, epilepsy, gastric problems, inflammatory disorders, infectious and sexual disorders. *F.religiousa* leaves alcoholic fraction showed that among all these fraction of FRI (160.3 µ M) and for FRIII (222.7 µ M) was observed. against human breast cancer cell line(MCF-7)(25).

Fig:19. *Ficus religiosa*

Andrographis paniculata

A.paniculata is an annual herbaceous plant in the family *Acanthaceae*, native to India and Sri Lanka.It is widely cultivated in Southern and Southeastern Asia, where it has been traditionally used to treat infections and some diseases. Mostly the leaves and roots were used for medicinal purposes.Since ancient times, *A. paniculata* is used in traditional Siddha and Ayurvedic systems of medicine as well as in tribal medicine in India and some other countries for multiple clinical applications. The herb has a number of purported medicinal uses, although research has found evidence of its effectiveness is limited to treatment of upper respiratory infection, ulcerative colitis and rheumatic symptoms; in particular, there is no evidence of its effectiveness in cancer treatment. The leaves of andrographis paniculata methanol extract used anticancer activity are assayed against MCF-7 and HT-29 cell lines. 50 % MCF-7 and HT-29 cell line inhibition at 200µg/ml tested dose.(26).

Fig:20. Andrographis paniculata

Duranta seeratifolia

Duranta is a genus of flowering plants in the *verbena* family, *Verbenaceae*. It contains 17 species of shrubs and small trees that are native from southern Florida to Mexico and South America. They are commonly cultivated as hedges and ornamental plants.The leaves of *D.seeratifolia* methanol extract used anticancer activity are assayed against MCF-7 and HT-29 cell lines. 50 % MCF-7 and HT-29 cell line inhibition at 200µg/ml tested dose.(27)

Fig:21. Duranta seeratifolia

Albizzia lebbeck

A. lebbeck is a species of *Albizia*, native to Indomalaya, New Guinea and Northern Australia and widely cultivated and naturalised in other tropical and subtropical regions. English names for it include lebbeck, lebbek tree, flea tree, frywood, koko and woman's tongues tree.The leaves of *Albizzia lebbeck* methanol extract used anticancer activity are assayed against MCF-7 and HT-29 cell lines. 50 % MCF-7 and HT-29 cell line inhibition at 200µg/ml tested dose.(28)

Fig:22. Albizzia lebbeck

Terminalia chebula

T. chebula, commonly known as yellow- or chebulic myrobalan, is a species of *Terminalia*, native to South Asia from India and Nepal east to Southwest China (Yunnan), and south to Sri Lanka, Malaysia and Vietnam.The *T.chebula* fruits methanol extract was ATP assay guided chromatographic fractionation of the extract yielded ellagic acid, 2,4-chebulyl-b-D-glucopyranose (a new natural product), and chebulinic acid which were tested by ATP assay on HOS-1 cell line in comparison to three known antigrowth phenolics of Terminalia, gallic acid, ethyl gallate, luteolin, and tannic acid. Chebulinic acid (IC50=53.2 mM + /_0.16)tannic acid (IC50=/59.0 mg/ml+ /-0.19)and ellagic acid (IC50=/78.5 mM + /- 0.24), (29).

Fig:23. Terminalia chebula

Trigonella foenumgracecum

Fenugreek is used for digestive problems such as loss of appetite, upset stomach, constipation, and inflammation of the stomach (gastritis). It is also used for conditions that affect heart health such as “hardening of the arteries” (atherosclerosis) and for high blood levels of certain fats including cholesterol andtriglycerides. Fenugreek is used for kidney ailments, a vitamin deficiency disease called beriberi, mouth ulcers, boils, bronchitis, infection of the tissues beneath the surface of the skin (cellulitis), tuberculosis, chronic coughs, chapped lips, baldness, cancer, and lowering blood sugar in people with diabetes. The fenugreek seed oil significantly reduced the cell viability, and altered the cellular morphology in a dose dependent manner. the cell lines, HEp-2 cells showed the highest decrease in cell viability, followed by MCF-7, WISH, and Vero cells by MTT and NRU assays. Cell viability at 1000 µg/ml was recorded as 55% in HEp-2 cells, 67% in MCF-7 cells, 75% in WISH cells, and 86% in Vero cells.(30)

Fig:24. Trigonella foenumgracecum

Berberis aristata

B. aristata, also known as Indian Barberry or Tree Turmeric, belongs to the family *Berberidaceae* and the genus *Berberis* . The genus comprises approximately 450-500 species of deciduous evergreen shrubs and is found in the temperate and sub-tropical regions of Asia, Europe, and America. *B. aristata* is native to the Himalayas in India and in Nepal.[1] It is also naturally found in the wet zone of Sri Lanka. The root bark contains berberine, quaternary ammonium salt of isoquinoline alkaloid. Berberine has antibacterial, antifungal, antiviral and antioxidant properties. It can possess anti-inflammatory, anti-tumor and anti-diabetic activities. A women's university in India, Shri Padmavathi Mahila Viswavidyalayam Tirupati, conducted a study to evaluate the effectiveness of ayurvedic medicine. The IC50 value for methanolic extracts of seed of *B.aristata* identified was 220µg. Further, significant decreased (80%: $p \leq 0.001$) colony formation at 500µg/ml of methanolic extracts was noticed by soft agar assay in MCF-7 cells. However, in vitro scratch assay revealed the significant ($p \leq 0.001$) inhibition of cell migration up to 50% at 250µg of extracts. In addition, significant (68%) increase of apoptosis at 500µg of extracts in MCF-7 cells was evidenced by live/dead assay.(31).

Fig:25. Berberis aristata

Curcuma longa

Turmeric (*C.longa*) is a rhizomatous herbaceous perennial plant of the ginger family, *Zingiberaceae*. It is native to southwest India, In India, turmeric has been used as a remedy for stomach and liver ailments, as well as topically to heal sores, basically for its supposed antimicrobial property. The active compound curcumin is believed to have a wide range of biological effects including anti-inflammatory, antioxidant, antitumour, antibacterial, and antiviral activities, which indicate potential in clinical medicine. The IC50 value for ethanol extracts of stem of *C.longa* identified was 200µg of of extract in MCF-7 cells was evidenced by live/dead assay(29).

Fig:26. Curcuma longa

Albzia amara

A. amara is a tree in the *Fabaceae* family. Its range includes southern and Eastern Africa, from South Africa to Sudan and Ethiopia. It is also found in India and Sri Lanka. The cytotoxicity of *A.amara* leaves extracts were detected by MTT assay, among the three solvent extracts, the ethyl acetate extract showed effective cytotoxic action with median inhibitory concentration (IC50) of 36.31µg/ml followed by ethanol extract with 57.54µg/ml and aqueous extract with 83.18µg/ml.(30).

Fig:27. Albzia amara

Limonia acidissima

L.acidissima is the only species within the monotypicgenus *Limonia*. It is native in the Indomalaya ecozone to Bangladesh, India, Pakistan, Sri Lanka, and in Indochinese ecoregion east to Java and the Malesia ecoregion. Vernacular names in English include: wood-apple, Bael fruit pulp has a soap-like action that made it a household cleaner for hundreds of years. The sticky layer around the unripe seeds is household glue that also finds use in jewellery-making. The glue, mixed with lime, waterproofs wells and cements walls. The glue also protects oil paintings when added as a coat on the canvas. Ground *Limonia* bark is also used as a cosmetic called thanakha in Myanmar, a practice that has spread to other parts of Southeast Asia. The fruit rind yields oil that is popular as a fragrance for hair; it also produces a dye used to colour silks and calico. The maximum inhibition of MCF-7 cells due to exposure to MELA was found at 1000 µg/ml of the fruit pulp methanol extracts was 79.69% inhibition. (31)

Fig:28. Limonia acidissima

Camellia sinensis

Camellia sinensis is a species of evergreen shrub or small tree whose leaves and leaf buds are used to produce tea. It is of the genus *Camellia* of flowering plants in the family Theaceae. Common names include "tea plant", "tea shrub", and "tea tree", The leaves have been used in traditional Chinese medicine and other medical systems to treat asthma (functioning as a bronchodilator), angina pectoris, peripheral vascular disease, and coronary artery disease. The black tea natural extract showed 0.00078 - 5 µg/mL added to the cultured cells and incubated for 216 h. BTE showed cytotoxic effects against all carcinoma cell lines, however HT-29 and MCF-7 cells were more sensitive than A549.(32).

Fig:29. Camellia sinensis

Melastoma malabathricum

Melastoma malabathricum, known also as Malabar melastome, Indian rhododendron and Singapore rhododendron is a flowering plant in the family Melastomataceae. Methanol extract from the leaves showed significant anticancer activity against MCF-7 cell lines with the IC_{50} value of 7.14 µg/ml while methanol and chloroform extract from the flowers exhibited a moderate activity towards MCF-7 cell line with the IC_{50} value of 33.63 µg/mL and 45.76 µg/mL respectively after 72 h of treatment.(33).

Fig:30. Melastoma malabathricum

Macrosolen parasiticus

Macrosolen parasiticus (L.) Danser belonging to *Loranthaceaea* (mistletoe family) is a parasitic plant that grows on different host plants such as mango, jack fruit, peepal, neem tree, etc., : In BSL bioassay, aqueous extract showed more significant ($P< 0.01$) cytotoxicity with LD_{50} 82.79 ± 2.67 µg/mL as compared to methanolic extract with LD_{50} 125 ± 3.04 µg/mL. The methanolic extract of *M. parasiticus* showed IC_{50} 97.33 ± 3.75 µg/mL (MTT) ($P< 0.05$) and 94.58 ± 3.84 µg/mL (SRB) ($P< 0.01$) assays against MCF-7. The aqueous extract of *M. parasiticus* demonstrated higher activity with IC_{50} 59.33 ± 3.3 µg/mL (MTT) ($P< 0.01$) and 51.9 ± 1.87 µg/mL (SRB) ($P< 0.01$) assays, after 48 h of exposure and thus showed significant dose(34).

Fig:31.**Macrosolen parasiticus**

Elephantopus scaber L

Elephantopus scaber is a tropical species of flowering plant in the sunflower family. It is native to Tropical Africa, Eastern Asia, Indian Subcontinent, Southeast Asia, and northern Australia. It has become naturalized in Tropical Africa and Latin America. Its natural habitat is subtropical or tropical moist montane forests. Different parts of the plant are used in traditional medicine of India as astringent agent, cardiac tonic, diuretic, to treat ulcers and eczema, in rheumatism, to reduce fever, and to eliminate bladder stones Lupeol is a triterpenoid, present in most of the medicinally effective plants and possess a wide range of biological activity against human diseases. Lupeol induced an effective change in the cell viability of MCF-7 cells with IC_{50} concentration as 80 µM. Induction of cell death, change in cell morphology and population of the cancer cells was observed in the lupeol treated cells, but the normal cells were not affected(35).

Fig:32. Elephantopus scaber

Pteris multifidi

Pteris multifida Poir. (*P. multifida*) is a medicinal plant belonging to genus of Pteris of Pteridaceae family. The crude ethanolic leaf extract showed weak antioxidant activity (IC50 = 89.84 µg/mL) whereas the methanolic fraction expressed quite strong antioxidant activity (IC50 = 21.9 µg/mL). showed a good ingredient of antioxidant activity with IC50 value of 37.70 ± 0.03 µg/mL. Crude ethanolic leaf extract had cytotoxic activity against HeLa and NCI-H460 cell lines while the methanolic fraction had cytotoxic activity against HeLa, NCI-H460 and MCF-7 cell lines. The crude ethanolic leaf extract and its methanolic fraction of *P. multifidi* showed the potential activity in antioxidant and anticancer activity. Rutin had a potent antioxidant activity while apigenin-7-*Oβ*-D-glucopyranoside had a strong anticancer activity against the human breast adenocarcinoma cell line MCF-7(36).

Fig:33. Pteris multifidi

Catharanthus pusillus

Catharanthus pusillus, belonging to apocynaceae family is an important medicinal plant and is cultivated mainly for its alkaloids, which have anticancer activities. The IC50 value of ethanolic extract of *C. pusillus* was determined as 4.02 µg/ml against MCF-7 cell line using MTT assay. The extract exhibited no significant cytotoxicity on normal cell line, PBMC. These findings show that the extracts from the leaves of C. pusillus can be used as a potential source for producing anticancer drugs.leaf(37).

Fig:34. Catharanthus pusillus

Premna serratifolia

Premna serratifolia (Syn: *Premna integrifolia*) is an important medicinal herb known as "Agnimantha" in Ayurveda and traditionally used for anticancer activity. *P. serratifolia*Linn., commonly known as Arni or Agnimantha, is a large shrub or a small tree common along the Indian peninsular and Andaman coast. The BSL bioassay of these leaf n-hexane fractions has indicated that PS-01 and PS-02 are more cytotoxic than other 2 sub-fractions purification these 2 fractions were analysed on MCF-7 and HT-29 cell lines. Result of this study has indicated that the sub-fractions PS-02 has significant cytotoxicity in both the cell lines which are depicted (LC_{50} value 100.0 and 99.9 µg/mL respectively(38).

Fig:35.*Premna serratifolia*

Primula auriculata

Primula auriculata is Primulaceae family.in this leaves 3-30cm long by 0.7-3cm wide, smooth, usually farinose, broadly oblong-lanceolate, sharply serrate to more or less entire. Flowers rose- pink to lilac with a paler eye, l-2cm across, in flattish umbels of eight to twenty on stems 8-40cm or more tall. Turkey to Iran at 2000-4000m., springs and streamisides above the tree-line.A relative of *P. rosea* but looking rather like *P. denticulata*. Very variable with five distinct subspecies; the dwarfest is ssp. *olgae*.Eastern Turkey to the Tien Shan and Pamir, including most of the Caucasus.*The Primula auriculata* methanol extractdemonstrated the highest cytotoxicity with IC50 of 25.79, 35.79 and 43.34 μg.mL−*1* against MCF7, HepG2 and HT- 29 cells, respectively. For some of the plants, their traditional use was correlated with the cytotoxic results, The cytotoxic species could be considered as potential of anticancer compounds.(aerial part)(39).

***Fig:36.*Primula auriculata**

Annona squamosal

Annona squamosa (Custard apple) belonging to family Annonaceae, is commonly found in India and cultivated in Thailand and originates from the West Indies and South America. It is considered beneficial for cardiac disease, diabetes, hyperthyroidism and cancer. The root is considered as a drastic purgative. The crushed leaves and flowers are sniffed to overcome hysteria and fainting spells, they are also applied on ulcer, wounds and cancer. The ethanol extract of *Annona squamosal* Flower exhibited significant activity against the MCF-7 cell line with an IC50 value of ml *were 6.87 μg/ml(40)*

Fig:37. Annona squamosal

Manilkara zapota

Manilkara zapota (Sapodilla) belonging to family Sapotaceae, is a long-lived, evergreen tree native to Southern Mexico, Central America and the Caribbean. It has been used in the indigenous system of medicine for the treatment of various ailments. Decoction of the bark is used for diarrhea and fever. An infusion of the young fruits and the flowers is drunk to relieve pulmonary complaints, cancer and fever. Leaf decoction is used for fever, hemorrhage, wounds and ulcers. The ethanol extract of ***Manilkara zapota*** Flower exhibited significant activity against the MCF-7 cell line with an IC50 value of ml *12.5 µg/ml(41).*

Fig:38. Manilkara zapota

Alangium salviifolium

Alangium salviifolium (Alangiacea) is a tropical deciduous tree with strong, yellowish root. It is widely distributed in hotter parts in India. It is also distributed in Malaya, South China to Philippines, East Africa and Tenasserim. The plant is used as medicine in India, China and Philippines1. Different parts of this plant are reported to possess acrid, astringent, emollient, anthelmintic diuretic and purgative properties. A total amount of 320µg/ml of alkaloidal compound showed 80% of viability on MTT assay and morphological changes in MCF-7 was observed. Further more alkaloidal compound exhibited its potential on inhibition of cell proliferation, cell cycle control, and DNA intercalation activity.(42)

Fig:39. *Alangium salviifolium*

Cassia garrettiana

Cassia garrettiana Craib, locally known in Thai as Samae-sarn, is one of the plants in the Caesalpiniaceae family. In Thai traditional medicine, the heartwood of this plant has been used as emmenagogue and as blood tonic for women, the ethanol extract of *Cassia garrettiana*heartwood showed marked inhibitory activity against several cancer cell lines including HT-29, HeLa, MCF-7 and KB cells. cassigarol E was active against MCF-7 (IC50 = 0.021 µg/mL(43).

Fig:40. Cassia garrettiana

Cichorium intybus

Cichorium intybus L. has wide applications in traditional folk medicine and a broad variety of biological activities. To our knowledge, no data are hitherto available in regard to the antitumor properties of the Bulgarian herb. The obtained results indicated that the 90% of ethanol extract possessed a selective inhibitory effect as seen by the predominant decrease in cancer cell viability compared to normal cells (17% at the highest concentration for MCF7 cells and 80% for MCF10A). The 50% inhibitory concentration of the cancer cell line was determined to be 429 µg/ml(44)

Fig:41. *Cichorium intybus*

Lavandula dentata

Lavandula dentata is a species of flowering plant in the Lamiaceae family, native to the Mediterranean, the Atlantic islands and the Arabian peninsula. Growing to 60 cm (24 in) tall, it has gray-green, linear or lance-shaped leaves with toothed edges and a lightly woolly texture The long-lasting, narrow spikes of purple flowers, topped with pale violet bracts, first appear in late spring. The whole plant is strongly aromatic with the typical lavender fragrance.*Lavandula dentata* (Lamiaceae) was identified. *L. dentate 95%* of ethanol extractexhibits promising cytotoxic activity with an IC*50* value of 39 µg/mL. Analysis of cell morphological changes, DNA fragmentation and apoptosis.(45)

Fig:42. Lavandula dentata

Marrubium vulgare

Marrubium vulgare (white horehound or common horehound) is a flowering plant in the family Lamiaceae, native to Europe, northern Africa, and southwestern and central Asia. It is also widely naturalized in many places, including most of North and South America. It is a grey-leaved herbaceous perennial plant, somewhat resembling mint in appearance, and grows to 25–45 centimetres (10–18 in) tall. The leaves are 2–5 cm (0.8–2.0 in) long with a densely crinkled surface, and are covered in downy hairs. The flowers are white, borne in clusters on the upper part of the main stem. *Marrubium vulgare* is used in treatment of jaundice, diabetes, fever and diuretic total alcoholic, Acacetin, Apigenin, and Acacetin-7-rhamnoside show high anticancer activity against breast carcinom a MCF7 where ED50 < 20µg\ml , whereas all of them have anticancer activity against Ehrlich tumor cell lines. The plant alcoholic extract of hole plant and isolated flavonoids also have high antioxidant activity *in vitro* using DPPH scavenging activity method.(46)

Fig:43. Marrubium vulgare

Solanum torvum

Solanum torvum belongs to *S*olanaceae (nightshade family) is a spiny herb or shrub 3-4 m tall found throughout the tropical parts of India and in Andaman. Leaves, Ovate, sinate or bilobed, lobes shallow, rarely deep, flowers white, in dense lateral racemes, berries globere, smooth, yellow or orangered, seeds smooth. Whole plants, fruits, leaves and root of *Solanum torvum* are used as antispasmodic, hypotensive, antibacterial, antifungal, anticonvulsant, CNS depressant activity, antiviral, anticoagulant, molluscicidal, clastogenic, mutagenic, insecticidal, antimalarial digestive, diuretic sedative, liver and spleen enlargement, haemostatic, antitussive and in rhagades. The results obtained were compared with methotrexate-a known anticancer drug. Extracts of *S.torvum* was found to be extremely effective in the prevention of cell proliferation of the mammary gland breast adenocarcinoma cell lines.(47).

Fig:44. Solanum torvum

Nelumbo nucifera

Nelumbo nucifera Gaertn. is a monogeneric plant belongs to family Nelumbonaceae, commonly known as rose of India, sacred water lily or East Indian lotus. Various pharmacologically active substances were separated from different parts of lotus mainly including alkaloids, flavonoids, triterpenoids, polyphenols, steroidsand glycosides. Methanol and acetone leaf extracts were used for anticancer activity by MTT assay. About of sample was used for MTT assay. Methanol leaf extract showed 27% and acetone leaf extract showed 7% in 100 µg/mL of MCF-7 breast cancer cell line(48).

Fig:45. *Nelumbo nucifera*

Scrophularia variegata

Scrophularia variegata M. Beib. (Scrophulariaceae) is an Iranian medicinal plant which is used for various inflammatory disorders in traditional medicine. The *S. variegata* extract showed significant effect cytotoxicity on MCF-7 human breast cancer cell line. Treatment with the extract induced apoptosis on the breast cancer cells by cell cycle arrest in G2/M phase. The 90% ethanol extract results indicated that cytotoxicity activity was associated with an increase of apoptosis as demonstrated by DNA fragmentation as well as an increase of the amount of caspase 3 and caspase 9. In addition, the phytochemical assay showed that the extract had antioxidant capacity and also flavonoids, phenolic compounds and phenyl propanoids were presented in the extract.(49)

Fig:46. *Scrophularia variegate*

Salvadora persica L

Salvadora persica is an evergreen shrub or small tree to 6-7m. Fruits have a sweet, agreeable, aromatic, slightly pungent and peppery taste. It has many biological activities such as antipyretic**,** anti-inflammatory and antifungal activities. The petroleum ether extract of bark is the most potent evaluated extract. It presented IC50=43.6 µg/ml against human hepatocellular carcinoma cell line-HepG2, IC50= 44.3 µg/ml against human breast carcinoma cell line-MCF7, 19.87 µg/ml against lung carcinoma cell line-A549 and 10.2 µg/ml against colon carcinoma cell line-HCT116, however the other extracts showed weak activities. Ursolic was more effective than oleanolic acid against HepG2, MCF7 and HCT116 (IC50= 26.32, 18.73 & 20.4µg/mL, respectively) while oleanolic was potent against A549 (IC50= 19.5µg/mL).(50)

Fig:47. Salvadora persica L

Syzygium cumini

Syzygium cumini (Family-Myrtaceae) is native to India and East Indies. It is commonly called as Jamu Koli in Odia; Black Plum, Java Plum in English and Jamun in Hindi. The plant possesses acetyl oleanolic acid, triterpenoids, ellagic acid, isoquercitin, quercetin, kaempferol and myricetin in different concentrations. Most of these compounds have been reported to possess antioxidant and free radical scavenging activities. The maximum inhibition of MCF-7 cells due to exposure to MESC was found at 1000 µg/ml of the methanol extractsof fruit pulp was 70.12% inhibition. The results showed dose dependent response against MCF-7 cell line.(51)

Fig:48. Syzygium cumini

Carissa opaca

Carissa opaca (Apocynaceae) is distributed in many mountainous parts of Indian subcontinent from Punjab to Himalayas in Pakistan and India, and Burma and Sri Lanka. *C. opaca* crude extract showed 78.5% inhibition against cancer cells at 500 µg/ml. Fractions were tested at 200 µg/ml concentration and were more active than crude extracts. Chloroform fraction of *C. opaca* showed maximum inhibition 99% followed by ethyl acetate and methanol fraction of *C. opaca* exhibiting 96% and 94% inhibition(52)

Fig:49. Carissa Opaca

Toona ciliata

Toona ciliata (Meliaceae) is a timber tree mainly grown in the tropical areas of Asia. Bark of plant is used to treat dysentery, fever, and menstrual disorders in Chinese folk medicine. Crude extract of *T. ciliata* showed 57% activity against cancer cells at 500 µg/ml. Fractions were tested at 200 µg/ml concentration and were more active than crude extracts. Ethyl acetate fraction of *T. ciliata* showed 78% inhibition of cancer cells at the same concentration.(52)

Fig:50. Toona ciliata

Vitex trifolia

Vitex trifolia is basically a sea side shrub from the family Lamiaceae or Verbenaceae. The *Vitex* genus family is comprised of about 250 species of shrubs and trees; it's widely cultivated in warm temperate and subtropical regions. *V. trifolia* L. is a shrub or shrubby tree that may grow up to 6 m. Its origin is unknown and several varieties have been described in distant countries as India and Mexico and Northern Sudan. The results showed that petroleum ether and methanol leaf extracts significantly reduced cell viability of MCF-7 cells in a concentration dependent manner. Concentrations of 125 µg/ml and above of petroleum ether and 500 µg/ml of methanol extract were found to be cytotoxic in MCF-7 cells. Cell mortality at 125, 250 and 500 µg/ml of petroleum ether extract was recorded as 98.80%, 93.40% and 87.75% respectively, whereas at 125, 250 and 500 of methanol extract values were 79.98%, 75.70% and 70.25%, respectively by MTT assay. MCF-7 and Vero cells exposed to 125, 250 and 500 µg/ml.(53).

Fig:51. Vitex trifolia

Dracunculus vulgaris

The genus *Dracunculus* (Araceae) is represented with only one taxon (*D. vulgaris* Schott) in Turkey, and tubers of this plant are used external in the treatment of rheumatism and hemorrhoids. *D. vulgaris* Schott is a poisonous plant, and the leaves and tubers of this plant have a toxic effect on humans and animals. Furthermore, eating the stem of this poisonous plant induces abortion5,6. Although the toxic properties of *D. vulgaris* Schott are well known, other biological effects of this plant are still unclear. Methanol extract dried ground tubers exhibited the greatest potency at 24 h and 72 h exposure time against MCF-7 cells by elicitingCC50 at concentrations of 6.45 and 4.56 µg/ml.(54)

Fig:52. Dracunculus vulgaris

Broussonetia papyrifera

Broussonetia papyrifera (L.) Vent, belonging to Moraceae commonly known as Paper mulberry, is widely distributed in temperate and tropical regions. It is native to Eastern Asia and is distributed throughout China, Korea, Thailand and Japan. The plant is highly invasive and commercially important as the stem bark is used in paper making. Trypan blue dye exclusion assay of leaf extract showed potent cytotoxic activity on MCF-7 and HeLa cell lines with IC50 values 105 µgmL-1 and 110 µgmL-1. The MTT assay confirmed the cytotoxicity of leaf extract with IC50 values 87.5 µgmL-1 and 106.2 µgmL-1 respectively. The bark extract showed better activity on HeLa cell line with IC50 75.3 µgmL-1 and 88.3 µgmL-1. The leaf and bark extracts exhibited moderate activity on HepG2 cell line. Methanolic extract of fruit indicated insignificant cytotoxic activity against three cell lines tested(55)

Fig:53. Broussonetia papyrifera

Coix lachrymal

Coix is the common name for the Chinese medicinal material *Coix lacryma-jobi* seed. The entire coix plant and its seed pod are commonly called Job's Tears, The plant is of the grass family that produces several edible grains such as wheat, corn, millet, and barley, and though more closely related to corn (maize), the coix seed has a size and appearance approximating that of barley, and has been referred to as coix barley. The 95% ethanol extract of *coix lachrymal* exhibited significant activity against the MCF-7 cell line with an IC50 value of 6.51 µg/ml(56)

Fig:54. Coix lachrymal

Dysoxylum caulostachyum

Dysoxylum is a flowering plantgenus of trees and shrubs, constituting part of the mahogany family (Meliaceae). Botanical science has recorded about eighty species in this genus, growing widely across the regions of Malesia, the western Pacific ocean, Australia and south & south-eastern Asia; centred on the tropics between the Pacific and Indian Oceans.They grow naturally in New Guinea, eastern and northern Australia, New Caledonia, Fiji, SE Asia, southern China, the Indian subcontinent, the Philippines, Taiwan, and in the western Pacific Ocean their most easterly occurrences, in the Caroline Islands, New Zealand and Niue.The ethyl acetate fraction of *Dysoxylum caulostachyum* leaf exhibited significant activity against the MCF-7 cell line with an IC50 value of 78 µg/ml.(57)

Fig:55. Dysoxylum caulostachyum

Eugenia aquea,

Syzygium aqueum is a species of brush cherry tree. Its common names include Water Cherry, Watery Rose Apple, and Lau Lau; names like "water apple" and "bell fruit" may refer to any species of Syzygium grown for its fruit. In Indonesia and Malay, it is known as jambu air meaning "water guava". In Bengali language, the fruit is called Golap Jaam. The tree is cultivated for its wood and edible fruit. The fruit is a fleshy yellow or red berry which is bell shaped, waxy and crisp. *Syzygium aqueum* is sold in Indonesia and Papua New Guinea. The tree requires heavy rainfalls and can survive in tropical habitats, up to 1600m from sea level. The wood is hard and can be used to make tools. The bark of the tree is sometimes used in herbal medicines. It is grown in orchards and gardens and parks as an ornamental plant. The leaves are edible and are sometimes used to wrap food.The ethyl acetate fraction of *Eugenia aquea* leaf exhibited significant activity against the MCF-7 cell line with an IC50 value of 24 µg/ml(57).

FIG:56.Eugenia Aquea,

Garcinia celebica,

Garcinia celebica, is a genus Garcinia (family Clusiaceae). Mid-canopy tree up to 36 m tall and 93 cm dbh. Stem with white to yellow latex. Leaves opposite, simple, penni-veined, glabrous. Flowers ca. 22 mm diameter, red, placed in leaf axils. Fruits ca. 35 mm diameter, green-yellow-reddish, fleshy berry, seeds with aril. The ethyl acetate fraction of Garcinia celebica, leafexhibited significant activity against the MCF-7 cell line with an IC50 value of 60 µg/ml(57).

Fig:57. Garcinia celebica

Psychotria valentonic

Psychotria viridis is a perennial shrub of the Rubiaceae family. The Machiguenga people of Peru use juice from the leaves as eye drops to treat migraine headaches. *P. viridis* grows to a height of approximately 5 m (16 ft). Its branches span a diameter of about 2 m (6 ft 7 in) The ethyl acetate fraction of *Psychotria valentonic* leaf exhibited significant activity against the MCF-7 cell line with an IC50 value of 23 µg/ml(57).

Fig:58.*Psychotria valentonic*

Table:1 The Plant with Anticancer Activity Against Breast Cancer Cell Line(MCF-7)

S.N.	Plant Biological Name	Family	Plant Parts	Extract	IC50 Value
1	*Acorus calamus*	*Acoraceae*	Whole plant	methanol	52.07 g/ml
2	*Artocarpus heterophyllus*	*Moraceae*	Whole plant	methanol	35.26 µgm/ml
3	*Cynodon dactylon*	*Poaceae*	Whole plant	Petroleum ether	0.156 mg/ml ,0.625 mg/ml
4	*Datura metal*	*Solanaceae*	Leaf	methanol	1000 µg/ml
5	*Elaeis guineensis*	*Arecaceae*	Whole plant	methanol	15.00 µg/ml
6	*Piper cubeba*	*Piperaceae*	Seeds	methanol	2.69 ± 0.09 µg/mL
7	*Piper nigrum*	*Piperaceae*	Fruits	methanol	8.33 ± 1.27, 7.48 ± 0.57 µg/ml
8.	*Phyllanthus emblica*	*Euphorbiaceae*	Chlorophyllin	-	150µg
9	*Prosopis cineraria*	*Fabaceae*	Leaf	methanol	110 µg
10	*Solanum anguivi*	*Solanaceae.*	Leaf	Ethyl acetate	1.25 mg/ml
11	*Tecomastans*	*Bignoniaceae*	Leaf	ethanol	7.8 µg/ml
12	*Vernonia amygodalina*	*Asteraceae*	Leaf	10% DMSO	56 mg/ml
13	*Vetiveria zizanioides*	*Poaceae*	Root	water	31µg/ml to 37µg/ml
14	*Artocarpus heterophyllus*	*Moraceae*	Bark	90% ethyl acetate	35.05+/- 0.72µg/ml
15	*Sesbania grandiflora*	*Fabaceae*	Bark	90% ethyl acetate	7.00+/- 0.08µg/ml
16	*Wrightia tinctoria*	*Apocynaceae.*	Bark	90% ethyl acetate	10.00+- 0.05µg/ml
17	*Inula graveolens*	*Asteraceae*	Whole plant	Chloroform/ethanol	3.83 µg/ml
18	*Tephrosia purpurea*	*Fabaceae*	Leaves	Ethanoic fraction	TPI(152.4 µ M),TPIII (158.71µ M)
19	*Ficus religiosa*	*Moraceae*	Leaves	Ethanoic fraction	FRI (160.3 µ M), FRIII (222.7 µ M)
20	*Andrographis paniculata*	*Acanthaceae*	Leaves	methanol	200µg/ml

21	*Duranta seeratifolia*	*Verbenaceae*	Leaves	methanol	200µg/ml
22	*Albizzia lebbeck*	*Fabaceae*	Leaves	methanol	200µg/ml
23	*Terminalia chebula*	*Combretaceae.*	Fruit	Methanol fraction	53.2 mM + /_0.16
24	*Berberis aristata*	*Berberidaceae*	Stem	methanol	500µg
25	*Curcuma longa*	*Zingiberaceae.*	Stem	methanol	200µg
26	*Albzia amara*	*Mimosaceae*	Leafs	ethanol	36.31µg/ml
27	*Trigonella foenumgracecum*	*Leguminosae*	Seed	oil	1000 µg/ml
28	*Limonia acidissima*	*Rutaceae*	Fruit-pulp	methanol	1000 µg/ml
29	*Camellia sinensis*	*Theaceae*	Leaf	Natural extract	0.00078 - 5 µg/mL
30	*Melastoma malabathricum*	*Melastomataceae*	leaf	Methanol	33.63 µg/mL - 45.76 µg/mL
31	*Macrosolen parasiticus*	*Loranthaceaea*	Stem	methanol	94.58 ± 3.84 µg/mL
32	*Elephantopus scaber*	*sunflower family*	Leaf	Lupeol compound	80 µM
33	*Pteris multifidi*	*Pteridaceace*	Whole plant	Ethanol and methanol fraction	37.70 ± 0.03 µg/mL
34	*Catharanthus pusillus*	*Apocynaceae*	Whole plant	Bioassay fraction	4.02 µg/ml
35	*Premna serratifolia*	*Verbenaceae*	Whole plant	ethanol	100.0 - 99.9 µg/mL
36	*Primula auriculata*	*Primulaceae*	Whole plant	methanol	*25.79, 35.79* - 43.34 µg.mL
37	*Annona squamosal*	*Annonaceae*	Flower	ethanol	*6.87 µg/ml*
38	*Manilkara zapota*	*Sapotaceae,*	Flower	ethanol	*12.5 µg/ml*
39	*Alangium salviifolium*	*Alangiacea*	Whole plant	Alkaloid compound	320µg/ml
40	*Cassia garrettiana*	*Caesalpiniaceae*	heartwood	ethanol	0.02µg/ml
41	*Cichorium intybus*	*Asteraceae*	Whole plant	90% ethanol	429 µg/ml
42	*Lavandula dentata*	*Lamiaceae*	Whole plant	90% ethanol	39 µg/mL
43	*Marrubium vulgare*	*Lamiaceae,*	Whole plant	90% ethanol	20µg\ml
44	*Solanum torvum*	*Solanaceae*	*fruit and root*	*aquevous extract*	*0.1-10*µg\ml
45	*Nelumbo nucifera*	*Nelumbonaceae*	Leaf	Methanol and actone	6.25 µg/mL

					to 100 µg/mL
46	*Scrophularia variegata*	*Scrophulariaceae*	Whole plant	90% ethanol	*200* µg/mL
47	*Salvadora persica*	*Salvadoraceae*	Whole plant	Aqueous ethanol	44.3 µg/ml
48	*Syzygium cumini*	*Myrtaceae*	fruit pulp	methanol	1000 µg/ml
49	*Carissa opaca*	*Apocynaceae*	Whole plant	Ethyl acetate fraction	200-500 µg/ml
50	*Toona ciliata*	*Meliaceae*	Whole plant	Ethyl acetate fraction	200-500 µg/ml
51	*Vitex trifolia*	*Lamiaceae or Verbenaceae*	Whole plant	methanol	500 µg/ml
52	*Dracunculus*	*Araceae*	Tubers	methanol	6.45 -4.56 µg/ml
53	*Broussonetia papyrifera*	*Moraceae*	Leaf	Ethanol and methanol	105 µgml - 110 µgmL
54	*Coix lachrymal*	*Poaceae*	Whole plant	95% ethanol	6.51 µg/ml
55	*Dysoxylum caulostachyum*	*Meliaceae*	Leaf	ethyl acetate fraction	**78** µg/ml
56	*Eugenia aquea,*	*Myrtaceae*	Leaf	ethyl acetate fraction	24 µg/ml
57	*Garcinia celebica,*	*Clusiaceace*	Leaf	ethyl acetate fraction	60 µg/ml
58	*Psychotria valentonic*	*Rubiaceae*	Leaf	ethyl acetate fraction	23 µg/ml

Conclusion

Medicinal plants maintain the health and vitality of individuals, and also cure various diseases, including cancer without causing toxicity. Plants derived components have played an important role in the development of several clinically useful anticancer agents. Many traditional healers use various medicinal plants for treating of various cancers. This review revealed that many of medicinal plants used by traditional healer are reported to have scientific evidence. There is a need to explore the plants which are not reported scientifically by in-vitro or in-vivo screening methods. These plants can provide potential bioactive compounds for the development of new 'leads' to combat cancer diseases.

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